Mark distribution

Total Marks	CIE	ESE	ESE Duration
100	50	50	3 hours

Continuous Internal Evaluation Pattern:

Maximum Marks: 50	
Attendance	15%
Maintenance of daily lab record and GitHub management	20%
Regular class viva	15%
Timely completion of day to day tasks	20%
Tests/Evaluation	30%

End Semester Examination Pattern:

Maximum Marks: 50			
Verification of Daily program record and Git Repository			5 marks
Viva			10 marks
Problem solving (Based on difficulty level, one or more questions may be given)	Flowchart / Algorithm / Structured description of problem to explain how the problem can be solved / Interface Design	15%	35 marks
	Program correctness	50%	
	Code efficiency	15%	
	Formatted output and Pushing to remote Git repository	20%	
Total Marks			50 marks

Course Level Assessment Questions

Course Outcome 1 (CO1):

1. Install latest version of Ubuntu on a virtual box, set up a static ip address to it and install drupal environment.
2. You are given a computer with very low hardware resources. It is to be used as a kiosk. Identify and install a suitable Linux distribution. You can simulate it in a virtual environment.

Course Outcome 2 (CO2)

1. You are given a system which is connected to internet. However, users logging on to the system are unable to access internet from their browser. Trouble shoot the issue,clearly documenting the steps you have taken (Possible issues to look for are browser configuration, network connectivity, routing, ip address configuration,DNS resolution)

2. You are given a system which boots to a non graphical environment. You are also given a shell script which is designed for a specific task. Your task is to make sure that the script runs every time the system boots up. Write/modify necessary scripts for this.

3. You are required to add 100 users to a Linux system. Details of the users to be added were collected from a web form to a csv file. The csv may contain errors such as wrong case or missing fields. Write a script to add users using the data provided in the csv file with proper error checking.

Course Outcome 3(CO3):

1. You are given a bare bone installation of latest version Ubuntu. Assume that the system is accessible from internet. Your task is to successfully install word press (or any other web application) on this server. Clearly indicate the steps taken and software installed for this task.

2. Assume that you have an installation of old version Ubuntu. However, it does not have the latest version of virtual box (or some other application). The new version is available as a binary on a website. Upgrade to this version.

Course Outcome 4 (CO4):

1.Look at the system log files. Write a shell script to extract the last login details of a particular user and list out all failed logins. Store the results to a file. The user name should be given as a command line argument.

2.Write a shell script to display the details of a particular process currently running. Assume that you have necessary permissions. The process name/id is to be given as a command line argument

Course Outcome 5 (CO5):

1.Capture network traffic on your system. Using wireshark find out all http and https traffic to a specific host.

2.Write an Ansible playbook to deploy a new Linux VM on a remote server.

Syllabus:

Introduction to Computer hardware. Study of various peripherals. Study of common operating systems. File system organization in common operating systems.

Study of command line environment in common operating systems. Study of command line tools for system administration.

Shell scripting: bash shell, shell scripts for system management.

Study of startup scripts.

Study of server software for common applications such as http, ftp, dns, dhcp.

Practical study of Ipv4 and Ipv6 networking protocols. Setting up firewalls.

Virtual machines and containers. Configuration and deployment.

List of Lab Experiments/Exercises

To gain proficiency in command line tools and operations, it is highly recommended to use a terminal window instead of GUI tools. This will later help the student with latest approaches in maintaining cloud based infrastructure. virtualbox/quemu. may be used for this.

1. Introduction to Computer hardware: Physical identification of major components of a computer system such as mother board, RAM modules, daughter cards, bus slots, SMPS, internal storage devices,i nterfacing ports. Specifications of desktop and server class computers. Installation of common operating systems for desktop and server use. (Students may be asked to formulate specification for computer to be used as Desktop, Web server)

2. Study of a terminal based text editor such as Vim or Emacs. (By the end of the course, students are expected to acquire following skills in using the editor: cursor operations, manipulate text, search for patterns, global search and replace)
   Basic Linux commands, familiarity with following commands/operations expected
   1. man
   2. ls, echo, read
   3. more, less, cat,
   4. cd, mkdir, pwd, find
   5. mv, cp, rm ,tar
   6. wc, cut, paste
   7. head, tail, grep, expr
   8 chmod, chown
   9. Redirections & Piping
   10. useradd, usermod, userdel, passwd
   11. df,top, ps
   12 ssh, scp, ssh-keygen, ssh-copy-id
   .
3. File system hierarchy in a common Linux distribution, file and device permissions, study of system configuration files in /etc, familiarizing log files for system events, user activity, network events.

4. Shell scripting: study bash syntax, environment variables, variables, control constructs such as if, for and while, aliases and functions, accessing command line arguments passed to shell

scripts. Study of startup scripts, login and logout scripts, familiarity with systemd and system 5 init   scripts is expected.

5.   Installation and configuration of LAMP stack. Deploy an open source application such as phpmyadmin and Wordpress.

6.   Installation and configuration of common software frame works such as Laravel. (Student should acquire the capability to install and configure a modern framework)

7. Build and install software from source code, familiarity with make and cmake utilities expected.

8. Introduction to command line tools for networking
    IPv4 networking, network commands: ping route traceroute, nslookup, ip. Setting up static and dynamic IP addresses. Concept of Subnets, CIDR address schemes, Subnet masks, iptables, setting up a firewall for LAN, Application layer (L7) proxies.

9.   Analyzing network packet stream using tcpdump and wireshark.   Perform basic network service tests using nc.

10.   Introduction to Hypervisors and VMs, Xen or KVM , Introduction to Containers: Docker, installation and deployment.

11. Automation using Ansible: Spin up a new Linux VM using Ansible playbook