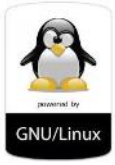
Government of Karnataka
Department of Technical Education
Bengaluru

	Course Title: **Linux Lab**		
	Scheme (L:T:P) : **0:2:4**	Total Contact Hours: **78**	Course Code: **15CS47P**
	Type of Course: **Tutorial, Practical's & Student Activity**	Credit **:03**	Core/ Elective: **Core**
CIE- 25 Marks			SEE- 50 Marks

Prerequisites

Basic Knowledge of Operating System and its usage.

Course Objectives

1. Describe the basic file system in Linux and its file attributes.
2. Appraise different filters, process handling, regular expressions and network handling features using suitable commands.
3. Summarize different Linux commands to write Shell Programs.

On successful completion of the course, the students will be able to attain CO:

Course Outcome		Experiment linked	CL	Linked PO	Teaching Hrs
CO1	Demonstrate installation of Linux operating system and understand the importance of Linux.	***1***	***U***	2,3,4,8,10	**06**
CO2	Appraise various command usage of files and directories.	***2 to 4***	***U, A***	2,3,4,8,10	**12**
CO3	Show the working of **vi** editor in all its modes using various commands.	***5 to 8***	***U, A***	2,3,4,8,10	**12**
CO4	Manage shell and processes using various commands.	***9 to 12***	***U, A***	2,3,4,8,10	**12**
CO5	Write Shell scripts and C programs using **vi** editor.	***13 to 21***	***A***	2,3,4,8,10	**30**
CO6	Demonstrate Linux administration and its environment	***22***	***A***	2,3,4,8,10	**06**
			Total sessions		**78**

Legends: R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Linux Lab	**-**	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

List of Graded Practical Exercises

PART-A

1. **Introduction-** Linux Architecture- Shell, Kernel, System calls.
Linux installation- Steps for installing Linux Operating System
Comparison between Linux and other Operating Systems, Applications of Linux Operating System.

2. **Internal & External commands in Linux.**
   - Internal commands- echo, type, etc.
   - External commands- ls, cp, mv, rm, cat, etc
   - Other commands – tput clear, who, cal, date, bc, man, passwd, uname (with different options).

3. **Working with files & directories**.
   - Know the categories of files.
   - Directory related Commands – pwd, mkdir, rmdir, cd, ls
   - Manipulating Absolute paths and Relative paths using **cd** command.
   - File related Commands – cat, cp, mv, rm, comm, cmp, diff, tar, umask, wc

4. **Basic File attributes.**
   - Listing seven attributes of a file : ls and its options
   - File Permissions: Absolute and Relative permissions
   - Manipulating File permissions using **chmod** command
   - Manipulating File Ownership using **chown** command
   - Manipulating Hardlink and Softlink using **ln** command

5. **Learn to use vi editor.**
   - Three modes of **vi** editor.
   - Input mode commands.
   - Command mode commands.
   - Ex mode commands.

6. **Simple Filters** – head, tail, cut, paste, sort, uniq, tr, pr.
7. **Expressions & search patterns** .(dot operator), *, ^, +, ?, grep, egrep, fgrep
8. **Process Management commands**.
   - Process creation, status, Identifying process, ps -f & its options,
   - Running process in background, Job control, and Process termination.

- Changing process priority, scheduling process (Usage of sleep and wait commands)

9. **Introduction to shell programming.**
   - Introduction, Uses of shell script, Shell special characters, comments, command separator, escaping, quoting command substitution.
   - Creating shell script, Shell identifiers, Shell variables, Destroying a variable, Positional parameters & command line arguments.
   - Evaluating expressions, Text formatting with echo & tput script termination.
10. **Shell control structures**
   - if, case, for, while, relational and logical operators,
   - Advanced filter – sed and awk.
11. **Linux system administration**
   Managing file system, Disk management utilities, mounts, umount, df, du, fdisk, su, useradd etc.
12. **Linux Environment**
   Introduction, Environment variables, Command prompt system variables, Profiles, files, terminal variable stty command and its options, Command history, editing Environment variable.

PART – B

13. Write a shell script to display current date, time, username and directory.
14. Write script to determine whether given file exist or not, file name is supplied as command line argument, also check for sufficient number of command line argument
15. Write shell script to show various system configuration like:
    a) Currently logged user name and his long name
    b) Current shell
    c) Your home directory
16. Write shell script to show various system configuration like:
    a) Your operating system type
    b) Your current path setting
    c) Your current working directory
    d) Show all available shells
17. Write a Shell script to accept any two file names and check their file permissions.
18. Write a Shell script to read a file name and change the existing file permissions.
19. Write a shell script to print current month calendar and to replace the current day number by '*'or '**' respectively.
20. Write a C-program to fork a child process and execute the given Linux commands.
21. Write a C-program to fork a child process, print owner process ID and its parent process ID.

22. Write a C-program to prompt the user for the name of the environment variable, check its validity and print an appropriate message.

References

1. "UNIX - Concepts and Applications", Sumitabha Das 4th Edition, Tata McGraw Hill, 2006.
2. http://www.freeos.com/guides/lsst/
3. http://heather.cs.ucdavis.edu/~matloff/Linux/LinuxInstall.pdf (Chapter 1, Linux installation).
4. http://docs.fedoraproject.org/en-US/Fedora/20/pdf/Installation_Guide/Fedora-20-Installation_Guide-en-US.pdf.

Suggested list of student activities

Note: the following activities or similar activities for assessing CIE (IA) for 5 marks (Any one)

Student activity like mini-project, surveys, quizzes, etc. should be done in group of 3-5 students.

1. Each group should do any one of the following type activity or any other similar activity related to the course and before conduction, get it approved from concerned course coordinator and programme coordinator.
2. Each group should conduct different activity and no repeating should occur

1	Conduct a survey on the advantages of Linux Operating System and prepare a report of 2 to 3 pages.
2	Prepare Report of 2 to 3 pages on Linux Administration.
3	Conduct a survey on other editors available in Linux Operating System with their features and prepare a report of 2 to 3 pages.
4	Compare the file system in Linux with the file system in Windows and submit a report.
5	Conduct a case study on handling various Networking Commands in Linux Operating System and submit a report.

Course Delivery

The course will be delivered through tutorials of two hours and four hours of hands on practice per week.

Course Assessment and Evaluation Scheme

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct assessment	CIE (Continuous Internal Evaluation)	IA Tests	Students	Two IA Tests (Average of two tests will be computed)	10	Blue books	1 to 6
				Record Writing (Average marks of each exercise to be computed)	10	Record Book	1 to 6
				Student Activities	05	Activities Report	1 to 6
				TOTAL	**25**		
	SEE (Semester End Examination)	End Exam		End of the course	50	Answer scripts at BTE	1 to 6
Indirect assessment	Student Feedback on course		Students	Middle of the course		Feedback forms	1 to 3 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1 to 6 Effectiveness of Delivery of instructions & Assessment Methods

***CIE** – Continuous Internal Evaluation ***SEE** – Semester End Examination

Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	10
2	Understanding	30
3	Application	60

Note to IA verifier*: *The following documents to be verified by CIE verifier at the end of semester

1. Blue Book(10 marks)
2. Record (10 marks)
3. Student suggested activities report for 5 marks
4. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

Format for Student Activity Assessment

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
					TOTAL	**13/4=3.25=4**

All student activities should be done in a group of 4-5 students with a team leader.

Scheme of Valuation for End Examination

1	Write the syntax of commands with examples from any one exercise from PART-A	10
2	Write any one program from PART-B	10
3	Execution of PART A commands and PART B Program with result	10+10
4	Viva voce	10
	Total	**50**

***Evaluation should be based on the screen output only. No hard copy required.*

***Change of question is allowed only once. Marks of 05 should be deducted in the given question.*

Resource requirements for Linux Lab

(For an Intake of 60 Students [3 Batches])

Sl. No.	Equipment	Quantity
1	PC systems (latest configurations with speakers)	20
2	Laser Printers	01
3	Networking (Structured) with CAT 6e / wireless 24 Port switches / Wireless Router I/O Boxes for networking(as required)	03
4	Broad Band Connection	01

***Open Source Software should be encouraged*

MODEL QUESTION BANK

PART -A

1) Write the syntax and execute the following commands.

Command Name	Syntax	Example
Echo		
Ls		
Cat		
Rm		
Cal		

2) Write the syntax and execute the following commands.

Command Name	Syntax	Example
ls –l		
Chmod		
Chown		
ln		

3) Write the syntax and execute the following commands.

Command Name	Syntax	Example
Pwd		
Mkdir		
Cd		
Comm.		
Cmp		

4) Write the syntax and execute the following commands.

Command Name	Syntax	Example
Head		
Tail		
Cut		
Paste		
Sort		

5) Write the syntax and execute the following commands.

Command Name	Syntax	Example
Umount		
Df		
Du		
Fdisk		
Su		

PART – B

1. Write a shell script to display current date, time, username and directory.
2. Write script to determine whether given file exists or not, file name is supplied as command line argument, also check for sufficient number of command line argument
3. Write shell script to show various system configuration like:
   a) Currently logged user name and his long name
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   c) Your home directory
   d) Your operating system type
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10. Write a C-program to prompt the user for the name of the environment variable, check its validity and print an appropriate message.