INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

COMPUTER SYSTEM INTERNALS AND LINUX LABORATORY								
VI Semester: CSE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
ACSD41	**Core**	0	0	2	1	40	60	100
Contact Classes: NIL	**Tutorial Classes: NIL**	**Practical Classes: 45**				**Total Classes: 45**		
Prerequisite: Operating Systems								

I. COURSE OVERVIEW:

This course aims to provide a well-rounded introduction to Linux, operating systems, and software development in a Linux environment. Linux is the blend of innovative concepts required by its unique environment involving kernel concepts, basic commands, shell scripting, file processing, socket programming, processes, and Inter-process communication (IPC). This course equips individuals with the knowledge and skills needed to work effectively in a Linux-based environment, software development, system administration, and security awareness industries and sectors.

II. COURSES OBJECTIVES:

The students will try to learn:

I	The fundamental concepts of the operating system include borne again shell (bash) with the Linux command line environment.
II	The shell programming uses arithmetic operations, control structures, and functions in shell scripts in vi editor.
III	Process management and inter-process communication are used for exchanging data between multiple threads in one or more processes.

III. COURSE OUTCOMES:

At the end of the course, students should be able to:

CO1	Demonstrate text processing utilities, file handling utilities, security by file permissions, process utilities, disk utilities, and networking commands with different options available for solving problems.
CO2	Make use of bourne shell constructs, decision structures, and loops in designing programs
CO3	Interpret to write, compile, debug, and run C language program in a Linux shell environment for implementing kernel-level concepts.
CO4	Identify basic methods and techniques used in solving simple programming tasks in the area of the execution environment, processes signals, and threads.
CO5	Experiment with IPC mechanisms such as pipes, named pipes, shared memory, message queues, semaphores and sockets for inter-process communication.
CO6	Choose the appropriate protocol such as TCP or UDP for effective communication in client-server applications.

IV. COURSE CONTENT:

Week – 1: Essential Linux Commands and Utilities

1. Practice on commands like help and man pages, Useful Commands/Utilities: pwd, cd pathname, ls, cat, less, more, touch filename, export name=value, top, hostname, uptime, date, Pipe and Input/Output Redirection,
2. File Handling Utilities: mv, rm, cp, mkdir, rmdir, File/Directory Ownerships and Permissions, disk utilities: du, df, ulimit, find

Week – 2: Advanced Linux Utilities and System Management

Practice on Process, Text, network and backup utilities, System and Application Software Directories, Processes utilities, Text Processing Utilities, Hard Links and Symbolic Links, Network Utilities, Tape Archive (tar) and ZIP Compression (gzip, bzip2)

Week – 3: Shell Scripting for File Management and User Monitoring

a) Write a Shell Program to read the type extension files and display all file names to output stream
b) Write a Shell program to move a set of files to a specified directory.
c) Write a Shell program to display all the users who are currently logged in after a specified time.

Week – 4: Shell Scripting for User Interaction and Text Processing

a) Write a Shell Program to wish the user based on the login time.
b) Write a Shell Program to delete all lines containing a specified word in one or more files supplied as arguments to it.
c) Write a shell script to read the starting line and ending line of a file and display the lines in between them.

Week – 5: Shell Scripting for Arithmetic Calculations

a) Write a shell script called Add2Integers that prompts the user to enter two integers
b) Write a shell script called SumProductMinMax3 that prompts the user for three integers
c) Write a shell script called Income Tax Calculator that reads the taxable income (in int).

Week – 6: Shell Scripting for Loops, Calculations, and User Input Handling

a) Write a shell script called Pension Contribution Calculator With Sentinel which shall repeat the calculations until the user enters -1 for the salary
b) Write a shell script using a loop to continuously input the tax-inclusive price (in double); compute the actual price and the sales tax (in double); and print the results rounded to 2 decimal places.
c) Write a shell script that prompts the user for a positive integer.

Week – 7: Shell Scripting for File Operations Simulation

a) Simulate cat command b) Simulate cp command

Week – 8: Shell Scripting for Text File Preview Simulation

a) Simulate head command b) Simulate tail command

Week – 9: Shell Scripting for File Management and Line Numbering

a) Simulate mv command b)Simulate nl command

Week –10: Signal Handling in Shell Scripting

Write a program to handle the signals like SIGINT, SIGDFL, SIGKILL

Week –11: Inter Process Communications

Implement the following IPC forms

a) PIPE: Write a program to implement one-way communication using pipes

b) FIFO: Write a program to implement one-way communication using the FIFO function.

Week –12: Message Queues

a) Write a program (sender.c) to create a message queue with read and write permissions to write three messages to it in sequence order.

b) Write a C program (**receiver.c)** that receives the messages (from the above message queue as specified and displays them to the output stream.

Week – 13: Shared Memory.

Implement shared memory form of IPC.

a) write a program to implement inter-process communication using shared memory.

Week – 14: Socket Programming

a) Write client and server programs (using c) for interaction between server and client processes using TCP Elementary functions.

b) Write client and server programs (using c) for interaction between server and client processes using UDP Elementary functions to convert given string to upper case.

V. TEXTBOOKS:

1. Sumitabha Das, "Your Unix The Ultimate Guide", Tata McGraw-Hill, New Delhi, India, 2007.
2. B. A. Forouzan and R. F. Gilberg, "Unix and Shell Programming", Cengage Learning.
3. Robert Love, "Linux System Programming", O'Reilly, SPD.

VI. REFERENCE BOOKS:

1. Stephen G. Kochan, Patrick Wood, "Unix Shell Programming", Sam's publications, 3rd Edition, 2007.
2. T. Chan, "Unix System Programming using C++", Prentice Hall India, 1999.

VII. ELECTRONICS RESOURCES:

1. http://spoken-tutorial.org/tutorial search/?Search Foss=Linux&search_language=English
2. https://www.redhat.com/en/files/resources/en-rhel-whats-new-in-rhel-712030417.pdf
3. http:// www.tutorialspoint.com/unix/
4. http://cse09-iiith.virtual-labs.ac.in/

VIII. MATERIALS ONLINE

1. Course Content
2. Lab Manual