UNIX and Shell Programming
[As per Choice Based Credit System (CBCS) Scheme]
(Effective from the Academic Year 2021-22)

SEMESTER – V

Subject Code	**21BCA55(A)**	CIE Marks	50
Number of Lecture Hours/Week	03	SEE Marks	50
Total Number of Lecture Hours	42	Exam Hours	03
CREDITS – 02			

Course Objectives:

- To provide introduction to UNIX Operating System and its
- File System To gain an understanding of important aspects related to the SHELL and the process
- To develop the ability to formulate regular expressions and use them for pattern matching.
- To provide a comprehensive introduction to SHELL programming, services and utilities.

Revised Bloom's Taxonomy Levels: L1 – Remembering, L2 – Understanding, L3 – Applying, L4 – Analyzing, L5 – Evaluating, and L6 – Creating

Module 1	Teaching Hours	RBT Levels
Unix Components/Architecture. Features of Unix. The UNIX Environment and UNIX Structure, Posix and Single Unix specification. General features of Unix commands/ command structure. Command arguments and options. Basic Unix commands such as echo, printf, ls, who, date,passwd, cal, Combining commands. Meaning of Internal and external commands. The type command: knowing the type of a command and locating it. The root login. Becoming the super user: su command. Naming files. Basic file types/categories. Organization of files. Hidden files. Standard directories. Parent child relationship. The home directory and the HOME variable. Reaching required files- the PATH variable, manipulating the PATH, Relative and absolute pathnames. Directory commands – pwd, cd, mkdir, rmdir commands. The dot (.) and double dots (..) notations to represent present and parent directories and their usage in relative path names. File related commands – cat, mv, rm, cp, wc and od commands.	10	L1,L2. L3,L4, L5
Module 2		
File attributes and permissions: The ls command with options. Changing file permissions: the relative and absolute permissions changing methods. Recursively changing file permissions. Directory permissions. **The shells interpretive cycle:** Wild cards. Removing the special meanings of wild cards. Three standard files and redirection **Connecting commands:** Pipe. Basic and Extended regular expressions. The grep, egrep. Typical examples involving different regular expressions. **Shell programming:** Ordinary and environment variables. The .profile. Read and readonly commands. Command line arguments. exit and exit status of a command. Logical operators for conditional execution. The test command and its shortcut. The if, while, for and case control statements. Simple shell program examples.	08	L1,L2, L3,L4. L5

Module 3		
UNIX File APIs: General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs **UNIX Processes and Process Control:** **Process Control:** Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions	08	L1,L2, L3,L4, L5.L6
Module 4		
Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User Identification, Process Times, I/O Redirection. **Overview of IPC Methods**: Pipes, popen, pclose Functions, Coprocesses, FIFOs, System V IPC, Message Queues, Semaphores..	08	L1,L2, L3,L4, L5,L6
Module 5		
Signals and Daemon Processes: Signals: The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, The sigsetjmp and siglongjmp Functions, Kill, Alarm, Interval Timers, POSIX.lb Timers. **Daemon Processes**: Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model.	08	L1,L2 L3,L4, L5
Course Outcomes		
On successful completion of the course, the students will be able to CO1 : Understand the basic concepts of UNIX Architecture and basic Commands. CO2: Understand different types of Files, File system and basic file system commands. CO3: Illustrate Shell Programming and to write Shell Scripts CO4: Categorize, compare and make use of Unix System Calls. CO5: Build an application/service over a Unix system.		
Question Paper Pattern		
The Question Paper will have Ten Questions. There will be two questions from each module. Each question will have questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.		
Text Books: 1. Sumitabha Das., Unix Concepts and Applications., 4thEdition., Tata McGraw Hill **2.** W. Richard Stevens: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education, 2005 **3.** Unix System Programming Using C++ - Terrence Chan, PHI, 1999		
Reference Books: 1. M.G. Venkatesh Murthy: UNIX & Shell Programming, Pearson Education 2. Richard Blum , Christine Bresnahan : Linux Command Line and Shell Scripting Bible, 2ndEdition, Wiley,2014.		