CA20110A **(3L + 1 T hrs./week)**

UNIX/LINUX INTERNAL

No. of questions to be set: Total 5 questions will be given from Unit I & Unit II.
No. of questions to be answered: All questions to be answered.

Objective: This course focuses on the principles and techniques of UNIX Operating System's concepts and terminologies, including file system programming and shell programming which includes advance UNIX commands and utilities, process management, signal management, Inter-process Communication issues and techniques.

Pre-requisites: Data Structures, Operating Systems and Programming language concepts. This course assumes that the student is familiar with C language and has some exposure to program writing in C language.

Course Outcomes (CO):

CO1	Students will be able to understand the concept of UNIX/Linux OS.
CO2	Students will be able to write programs using UNIX/Linux internals.
CO3	Students will gain knowledge of UNIX architecture.

UNIT I

Introduction [5 Hrs.]
Evolution of UNIX Operating System, Introduction to Multi-user System, Features and benefits of UNIX, Versions of UNIX, Standards and flavours of UNIX, User perspective services, Operating System perspective services, Assumptions about hardware, Kernel architecture of UNIX Operating System.

UNIX Important Commands [5 Hrs]
Changing directories, making files and directories, Commands used for user management, File management, changing file permission, process management, foreground and back ground processes. Creating commands by user.

UNIX File System and Hierarchy [5 Hrs]
UNIX file systems and file hierarchies, Internal structure of a file systems, Mounting,
I-nodes and file attributes and permissions, The dirent structure, Manipulating directories and i-nodes, introduction to the file descriptors.

System calls for file systems [5 Hrs]
Open, Close, File creation, Special files creation, Read, Write, File and record locking, Adjusting the position of file I/O, lseek, Change Directory, Change Root, Change Owner and Change Mode, Applications of stat and fstat system calls.

UNIT II

Process creation and process control [6 Hrs]
Introduction to a process, process creation, fork, vfork system calls, Process identifiers - Process relationships, Process image, Process States and Transitions, Manipulation of Process address

space, Sleep and termination of a process, User-ID of a Process, Chain and tree of a process. Changing the size of a Process, The Shell, System Boot and INIT process.

Inter-process Communications [5 Hrs]
Process memory management, inter process communication using pipe named pipe, Shared memory concepts and implementation, inter-process communication using socket for remote machines.

Sharing of files among processes [4 Hrs]
Applications of Pipes, Dup and Dup2 systems calls, Mounting and un-mounting the file system, Link and Unlink the file System, The maintenance of file system.

Signals [5 hours]
Basics of signals, Types of signals and its applications, raising a signal, Designing a signal handler with UNIX system calls. Inter-process Communication using signal.

Text Books:
1. Sumitabha Das, "UNIX Concepts and Applications", McGraw Hill.
2. W.Richard Stevens, Advanced programming in the UNIX environment, Addison Wesley, 1999.
3. Karee Christian, "The Unix Operating System", John Wiley & Sons.

Reference Books:
1. Vahalia, "UNIX Internals: The New Frontiers", Pearson Education Inc, 2003.
2. UreshVahalia, "UNIX Internals: The New Frontiers", Prentice Hall, 2000.
3. M. Beck, et.al , "Linux Kernel Programming", Pearson Education Asia, 2002.