DSCE
Dept. of Information Science & Engg

DAYANANDA SAGAR COLLEGE OF ENGINEERING

(An Autonomous Institute Affiliated to VTU, Belagavi) Approved by AICTE & ISO 9001:2008 Certified)
Accredited by National Assessment & Accreditation Council (NAAC) with 'A' grade
Shavige Malleshwara Hills, Kumaraswamy Layout, Bengaluru-560078

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

SCHEME 2018

UNIX SYSTEM PROGRAMMING

Course code: 18IS5DEUSP | **Credits: 03**

L: P: T: S: 3: 0: 0: 0 | **CIE Marks: 50**

Exam Hours: 03 | **SEE Marks: 50**

Total Hours: 40

Course Objectives:

1. To gain ample understanding of UNIX operating system and its usage.
2. To gain comprehensive knowledge about UNIX architecture.
3. To understand the design principles and significance of UNIX files and processes.
4. To know the basic concepts of Signals and Inter process communication in UNIX.

Course Outcomes: After completion of the course, the graduates will be able to

CO1	Analyze and understand the basics and usage of UNIX operating system.
CO2	Analyze the architecture and apply the various commands of UNIX operating system.
CO3	Outline the features of UNIX files and apply the different APIs for the usage of the same.
CO4	Demonstrate comprehensive knowledge of UNIX processes.
CO5	Summarize the various features of UNIX processes and the various APIs used for the same.
CO6	Summarize the Daemon processes and Inter process communication in UNIX.

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Mapping of Course outcomes to Program outcomes:

	PO 1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO 8	PO9	PO1 0	PO1 1	PO1 2
CO 1	3	3	3	3	-	3	-	-	-	2	-	-
CO 2	3	3	3	-	2	3	-	-	2	-	-	-
CO 3	3	3	3	-	-	3	-	-	2	-	-	-
CO 4	3	3	3	-	-	-	3	-	3	-	-	-
CO 5	3	3	3	-	-	-	3	-	-	2	-	-
CO 6	3	3	3	-	-	-	3	-	-	-	-	-

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Unit	Course Content	Hours	COs
1	**UNIX Operating System:** The Unix Operating System, The UNIX architecture and Command Usage, The File System, Handling Ordinary files, Basic File Attributes, the vi Editor, The Shell, The Process, Essential Shell Programming. **UNIX Standards:** ANSI C Standards, ANSI/ISO C++ standards, Difference between ANSI C and C++, The POSIX Standards	08	CO1 CO2
2	**UNIX Files:** File Types, The UNIX and POSIX File System, File Attributes, Inodes in UNIX System V, Application Program Interface to Files, UNIX Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links. **UNIX File APIs:** General File APIs, File and Record Locking.	08	CO1 CO3
3	**UNIX Processes:** The Environment of a UNIX Process: Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes.	08	CO1 CO4
4	**Process Control:** Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User Identification, Process Times, I/O Redirection. **Process Relationships:** Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp and tcsetpgrp Functions, Job Control, Shell Execution of Programs, Orphaned Process Groups.	08	CO1 CO5
5	**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, Timers. **Daemon Processes:** Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model.	08	CO1 CO6

	Inter process Communication: Overview of IPC Methods, Pipes, popen, pclose Functions, Coprocesses, FIFOs, System V IPC, Message Queues.		

Self-study component:

UNIT 2: Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs, General File Class, regfile Class for Regular Files, dirfile Class for Directory Files, FIFO File Class, Device File Class, Symbolic Link File Class, File Listing Program.

UNIT 5: Semaphores, Shared Memory, Client-Server Properties, Stream Pipes, Passing File Descriptors, An Open Server-Version 1, Client-Server Connection Functions.

Assignment:

1. Write a shell script program to display list of user currently logged in.
2. Write a shell script program to display "HELLO WORLD".
3. Write a shell script program to develop a scientific calculator.
4. Write a shell Script program to check whether the given number is even or odd.
5. Shell script Program to search whether element is present is in the list or not.

6. Shell script program to check whether given file is a directory or not, count number of files in a director, copy contents of one file to another.
7. Write a shell script program to display the process attributes, change the priority of processes and change the ownership of processes.
8. Write a program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen.

9. a) Write a program to send back a process from foreground.
   b) Write a program to retrieve a process from background.

10. Write a C program to create a file with 16 bytes of arbitrary data from the beginning and another 16 bytes of arbitrary data from an offset of 48. Display the file contents to demonstrate how the hole in file is handled.

Note:

1. Questions for CIE and SEE not to be set from self-study component.

2. Assignment Questions should be from self-study component only.

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TEXT BOOKS

1. Sumitabha Das: UNIX – Concepts and Applications, 4th edition, Tata McGraw Hill.
2. Terrence Chan: UNIX System Programming Using C++, Prentice Hall India. (Chapters 1, 5, 6, 7, 8, 9, 10)
3. W. Richard Stevens: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education. (Chapters 7, 8, 9, 13, 14, 15)

REFERENCE BOOKS

1. Marc J. Rochkind: Advanced UNIX Programming, 2nd Edition, Pearson Education, 2005.
2. Maurice J Bach: The Design of the UNIX Operating System, Pearson Education, 1987.
3. Uresh Vahalia: UNIX Internals: The New Frontiers, Pearson Education, 2001.

Assessment Pattern:

CIE –Continuous Internal Evaluation Theory (50 Marks)

Bloom's Category	**Tests**	**Assignments**	**AAT1**	**AAT2**
Marks (Out of 50)	**30**	**10**	**05**	**05**
Remember	08	--	02	01
Understand	08	--	01	01
Apply	02	05	--	01
Analyze	05	05	02	02
Evaluate	05			
Create	02			

***AAT 1– Alternate Assessment Tool 1: Quiz**

AAT 2 - Alternate Assessment Tool 2: Open Book Test

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SEE –Semester End Examination Theory (50 Marks)

Bloom's Category	**Marks Theory(50)**
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	08
Create	02

*AAT 1– Alternate Assessment Tool 1: Quiz

AAT 2 - Alternate Assessment Tool 2: Open Book Test

SEE –Semester End Examination Theory (50 Marks)

Bloom's Category	Marks Theory(50)
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	08
Create	02