Academic Year	Aug-Dec 2020/Jan-May-2021	Sem	5th
Course Title:	Unix Shell and System Programming		
Course Code:	20CS5PCUSP		
L-T-P:	3-0-1	Total Credits:	4

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**UNIX Architecture and Command Usage:** Unix Architecture, Features of UNIX, POSIX and the Single UNIX Specification, Internal and External Commands, Command Structure, Flexibility of Command Usage, Man Browsing the manual pages online **General Purpose Utilities:** cal, date, echo, printf, bc, script, Email basics, passwd, who, uname, tty, stty **The File System** The File, What's in a (File)name?, The Parent-Child Relationship, the HOME variable, pwd, cd, mkdir, rmdir, Absolute Pathnames, Relative Pathnames, ls, The UNIX File System **Handling Ordinary Files** cat, cp, rm, mv, more, the lp subsystem, file, wc, od, cmp, comm, diff, dos2unix and unix2dos, compressing and archiving files, gzip and gunzip, tar, zip and unzip	7	**Text Book 1 Chapter 2:** 2.1, 2.2, 2.3, 2.5, 2.6, 2.7, 2.8 **Text Book 1 Chapter 3:** 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.9, 3.10, 3.11, 3.12, 3.13 **Text Book 1 Chapter 4:** 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12 **Text Book 1 Chapter 5:** 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 5.14, 5.15, 5.16, 5.17
2	**Essential Shell Programming:** Shell Scripts, read, Using command line arguments, exit and exit status of command, the logical operators && and || - conditional execution, the if conditional, using test and [ ] to evaluate expressions, the case conditional, expr, $0, while, for, set and shift, the here document(<<), trap, debugging shell scripts with set -x	9	**Text Book 1 Chapter 14** 14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.8, 14.9, 14.10, 14.11, 14.12, 14.13, 14.14, 14.15, 14.16
3	**Basic File Attributes:** ls –l, the –d Option, File Ownership, File Permissions, chmod, Directory permissions, Changing file ownership **More File Attributes:** File Systems and Inodes, Hard Links, Symbolic Links and ln, the directory, umask, Modification and Access Times, find **Simple Filters:** The sample database, pr, head, tail, cut, paste, sort, uniq, tr, an example: displaying a word count list **Filters using Regular Expressions - grep:** grep, BRE introduction, ERE and egrep	7	**Text Book 1 Chapter 6** 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7 **Text Book 1 Chapter 11** 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7 **Text Book 1 Chapter 12** 12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7, 12.8, 12.9, 12.10 **Text Book 1 Chapter 13** 13.1, 13.2, 13.3

4	**UNIX and ANSI Standards:** The ANSI C standard, the ANSI/ISO C++ Standard, Differences between ANSI C and C++, The POSIX Standards **UNIX and POSIX APIs:** The POSIX APIs, The UNIX and POSIX Development Environment, API common characteristics **UNIX File APIs:** General File APIs, File and Record Locking, Directory File APIs, Device File APIs	7	**Text Book 2** **Chapter 1** 1.1, 1.2, 1.3, 1.4 **Text Book 2** **Chapter 5** 5.1, 5.2, 5.3 **Text Book 2** **Chapter 7** 7.1, 7.2, 7.3, 7.4
5	**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 **Process Control:** Introduction, Process Identifiers, fork(), vfork(), exit(), wait(), waitpid() **Interprocess Communication:** Introduction, Pipes, popen and pclose functions, FIFOs	9	**Textbook 3** **Chapter 7** 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10, 7.11 **Textbook 3** **Chapter 8** 8.1, 8.2, 8.3, 8.4, 8.5, 8.6 **Textbook 3** **Chapter 14** 14.1, 14.2, 14.3, 14.5

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1	Unix Concepts and Applications	Sumitabha Das	4th Edition	Tata McGraw Hill	1992
2	UNIX System Programming using C++	Terrance Chan	First Impression	Pearson Education	2008
3	Advanced Programming in the UNIX Environment	W. Richard Stevens	Fifth / Indian Reprint	Pearson Education	2001

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	UNIX & Shell Programming	M.G. Venkatesh Murthy	Second Impression	Pearson Education	2007
2.	The Complete Reference UNIX	Kenneth Rosen, Douglas Host, Rachel Klee, James Farber, Richard Rosinski	Second Edition, 6th Reprint	Tata McGRAW-HILL Edition	2008

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
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MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Linux Shell Scripting: A Project-Based Approach to Learning	Udemy	2020	https://www.udemy.com/course/linux-shell-scripting-projects/

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to **understand** the knowledge of UNIX Shell commands & UNIX System APIs and **apply** the functionality of the same.
CO2	Ability to **analyse** the given commands & shell programs, to identify the errors and generate the desired outputs.
CO3	Ability to **design** UNIX shell scripts and system programs, for the given requirements.
CO4	Ability to **conduct** experiments to **demonstrate** the various commands of UNIX Shell and System APIs.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3												1		
CO2		3											1		
CO3			3										1		3
CO4					3								3		3

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	TWO	20
QUIZ	ONE	05
Lab Component	2 Lab Tests + Continuous Evaluation	25
Alternate Assessment Tool	--	---
Total		50

E Tutorial Plan *(if applicable)*

F Laboratory Plan *(if applicable)*

Note:

i. Open ended questions should be designed by course teachers of all sections at the start of semester.

ii. Before lab Test-1, first set of open ended questions will be evaluated for 10 marks and will be included as part of the continuous evaluation process of lab

iii. Before lab Test-2, second set of open ended questions will be evaluated for 10 marks and will be included as part of the continuous evaluation process of lab.

Sl. No	Program	Unit No
1	Shell script to find if the given year is leap or not	2
2	Shell script to find the area of a circle	2
3	Shell script to check whether the number is zero/ positive/ negative	2
4	Shell script to find the biggest of three numbers	2
5	Shell script to find the factorial of a number	2
6	Shell script to compute the gross salary of an employee	2
7	Shell script to convert the temperature Fahrenheit to Celsius	2
8	Shell script to perform arithmetic operations on given two numbers	2
9	Shell script to find the sum of even numbers upto n	2
10	Shell script to print the combinations of numbers 123	2
11	Shell script to find the power of a number	2
12	Shell script to find the sum of n natural numbers	2
13	Shell script to display the pass class of a student	2
14	Shell script to find the Fibonacci series up to n	2
15	Shell script to count the number of vowels of a string	2
16	Shell script to check number of lines, words, characters in a file	3
17	Write a C/C++ program to that outputs the contents of its environment list	5
18	Write a C/C++ program to emulate the Unix **ln** command	3,4
19	Write a C/C++ POSIX compliant program that prints the POSIX defined Configuration options supported on any given system using feature test macros.	4
20	Write a C/C++ program which demonstrates Interprocess Communication between a reader process and a writer process. Use mkfifo, open, read, write and close apis in your program.	5

G   Alternate Assessment Tool Plan(if applicable)

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Mandatory	One Question to be asked for 20 Marks
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Internal Choice	Two Questions to be asked for 20 Marks each

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%