College Roll..Student Name:..

B.TECH –OPERATING SYSTEMS LAB ASSIGNMENTS (CSEN3113)

COMPUTER SCIENCE & ENGINEERING, HERITAGE INSTITUTE OF TECHNOLOGY
3rd Year, 5th SEMESTER
Jul - Dec, 2019

Sections - A, B and C

Faculty Members: …………………………

Technical Staffs: ……………………………

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Day	Lessons
1	**Self Assessment with General Purpose Utilities in UNIX-like Systems** 1. What is a directory? 2. Significance of HOME variable: The Home Directory. 3. Operations on directories: a. Check the current directory. b. Change the current directory. c. Create new directory (s). d. Remove directory (s). 4. Absolute pathnames, Relative pathnames. 5. What is a command? 6. What is *ls* Command? 7. How to *switch* Directories? 8. How to display the user currently working on the system? 9. How to display the name and version of your operating system? 10. How to display the *calendar* of a *month* or *year*? 11. How to display the *current system date* and *time* in a variety of formats? 12. How to use *echo* to display a message on the terminal? **Handling Ordinary Files:** The File System: 1. The File. What’s in a (File) name? 2. Display, create, copy, move, delete, and rename file. 3. Counting Lines, Words and Characters of file(s). 4. Comparing Two Files. 5. What is Common between two files?

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2	**Handling Ordinary Files (contd..)** 1. Compressing, decompressing and archiving file(s). **Basic File Attributes :** 2. File Ownership. File Permissions. **File Filters:** 3. Filter Commands: head, tail, cut, sort, uniq, tr, grep, sed.
3	**Shell Programming** 1. Write a shell script to calculate addition of two numbers. 2. Write a shell script to compare two numbers. 3. Write a shell script to calculate whether a given number is odd or even. 4. Write a shell script to calculate the sum of digits of any number entered through the keyboard. 5. Write a shell script to show the maximum of three numbers. 6. Write a shell script which displays the result of division of one integer by another integer and informs if the user tries to divide an integer by 0. 7. Write a shell script that takes a number from user and prints the reverse of the number. 8. Write a shell script to check whether a given number is prime or not. 9. Write a shell script which displays the message “welcome” and prints the date when you log in to your system. 10. (How to read a File line by line in a Shell Script?) Write a shell script which reports names and sizes of all files in a directory (directory should be supplied as an argument to the shell script) whose size exceeds 500 bytes. The filenames should be printed in decreasing order of their sizes. The total number of such files should also be reported. 11. Write a shell command that accepts a filename as argument and displays the last modification time, if the file exists and a suitable message if it does not.

	12. Write a shell script that accepts two directories namely OS1 and OS2 as arguments and deletes those files in OS2 which are identical to their names in OS1. 13. Write a shell script to list the names of files under the current directory started with vowels. 14. Write a shell script to drop the lines which are matched with a given word. 15. Write a shell script that shows the names of all the non-directory files in the current directory and calculates the sum of the size of them. 16. Write a shell script to find the total number of words, characters, lines in the given file (name of the file given in command line argument).
4	**Process-1** 1. Creation of a process. 2. Write a program to get the PID of parent and child process. 3. Implement an orphan process using fork. 4. Implement a zombie process using fork. 5. Write a program with a local variable and a global variable. Initialize both of them. The program should fork a child process and the child should increment both the variables by 1. After this operation, both the parent and the child should print the values of the variable. 6. Implement the assignment no. 5 using vfork for spawning the child.
5	**Process-2** 1. Write a program that creates *three* child processes. The first child process executes the command “who”, the second child process executes the command “ls” passing it the parameter “–al” using execlp(..) C function and the third child process executes the command “date” with path ”/bin/date” in execl() C function. The parent process *waits* for all the child processes to finish and prints the termination status of the child. (C Library unistd.h contains all exec…. Functions)

	2. Write a program to create a process which will run as a background process for fifty seconds and at the time of execution it will print the system information. 3. Write a program that creates two child processes. Each of the child process prints numbers from 1 to 10. Each time a child prints a number it also prints its own PID and parent PID. The parent waits for both of its child to finish execution and prints “Good Bye” before exiting.
6	**Threads-1** 1. Write a program to create a thread that displays a WELCOME message. 2. Write a program that creates multiple threads and terminate those. The program should create 5 threads with the pthread_create() routine. Each thread prints a “Hello World!” message and then terminates with a call to pthread_exit(). 3. Write a program which implements thread with arguments and thread joining.
7	**Threads-2** 1. Write a multi-threaded program where the main thread gets an integer number range from the user and then creates two child threads; one thread finds odd numbers in the range and print them, and the second thread finds even numbers in the range and prints them. The child thread must terminate by returning a value. The parent thread must wait for the child threads to finish and it must also print the return values of the child threads. 2. Write a multi-threaded program where the main thread gets an integer number range from the user and then creates two child threads; one thread calculates the sum of all numbers in the range and prints it, and the second thread finds prime numbers in the range and prints them. The child thread must terminate by returning a value. The parent

	thread must wait for the child threads to finish, and it must also print the return values of the child threads.
8	**Signals** 1. Write a program to create a child process. The parent catches a SIGCHLD signal from the child process when the child terminates (the child sends SIGCHLD when either it is interrupted or it resumes after being interrupted). 2. Write a program to print the default message of SIGINT signal and also prints the user. 3. Write a program for a process which cannot be killed by pressing Ctrl + c and again restore the default status of it. (Print necessary messages where required). 4. Process A and Process B normally sleep, except when process A receives signal SIGUSR1 and process B receives signal SIGUSR2, when both the processes prints the message "I am awake" and terminate. Write a program to incorporate this. 5. Write a program which takes a value of delay as command line argument and creates a child process. The parent process waits for the child process to finish its job up to the supplied delay value. If the child terminates within the delay the parent prints the termination status and PID of the child process. On not receiving from the child it kills the child process forcefully.
9	**Inter-process Communication – Pipes** 1. Write a code in C to implement how a process communicates with another process using the **pipe** function. 2. Write a code in C to implement how a process communicates with another process using the **popen** function. 3. Write a program that creates a one-way pipe between a parent and child process. The parent process gets a string from standard input and

	sends the string to the child. The child prints the reverse of the string. Both parent and child terminates when the string “quit” is input. 4. Write a program that creates a two-way pipe between a parent and child process. The parent process gets an integer from standard input and sends the integer to the child and the child computes the sum of all integers up to the input value received from parent and sends the result back to the parent process, which then prints it. Both the parent and child terminates when the number 0 is input. 5. Write a program that creates one-way pipe between a parent and three child processes. The parent process gets an integer number range from standard input and divides the entire range to three child processes. Each of the child after receiving the sub-range, searches for prime numbers in that range and prints them.
10	**Semaphores** 1. Solve the producer consumer problem for a single piece of data using binary semaphore. 2. Solve the above problem for two consumer processes. 3. Solve the producer problem by a bounded length array. 4. Write a program that uses several Pthread condition variable routines. The main routine creates three threads. Two of the threads perform work and update a "count" variable. The third thread waits until the count variable reaches a specified value (say 500).