IT ESSENTIALS AND PYTHON PROGRAMMING LAB
(Common to CSE, CSE (AI&ML), CSE (DS))

Course Code: 22CS1101

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Course Outcomes: At the end of the Course the student shall be able to:

CO1: apply basic LINUX commands to perform various operations. (L3)

CO2: demonstrate the connection of the Local Area Network and access the Internet.(L3)

CO3: implement programs using conditional statements and loops and strings.(L3)

CO4: develop functions to perform simple tasks.(L3)

CO5: make use of various data types like strings, lists, tuples, sets and dictionaries.(L3)

List of Activities: (Any **Six** activities should be carried out)

1. Practice the following commands in Linux:
   A. Internal commands- echo, date etc.
   B. External commands- ls, bc, sort, head and cal etc.
   C. Other commands – tput, clear, who, man, passwd, uname (with different options).
2. Practice File and Directory commands in Linux:
   A. Directory related Commands – pwd, mkdir, rmdir, cd, ls.
   B. Manipulate Absolute paths and Relative paths using cd command.
   C. File related Commands – cat, cp, mv, rm, comm, cmp, diff, tar, umask, wc.
3. Perform the following in Linux:
   A. List the seven attributes of a file : ls and its options.
   B. File Permissions: Absolute and Relative permissions.
   C. Manipulate File permissions using chmod command.
   D. Manipulating File Ownership using chown command.
   E. Miscellaneous: apt-get.
   F. Networking Commands: ping, ssh, ifconfig, netstat, traceroute.
4. Illustrate the use of Git and version control using Git commands.
5. Configure the TCP/IP settings, customize web browsers with the LAN proxy settings, use bookmarks, Plug-ins and pop up blockers.
6. Practice the following Internet Services:
   A. Antivirus installation, configuring a firewall, blocking pop-ups.
   B. Email creation and usage, Creating a Digital Profile on Linkedin.
   C. Source control on Github, Hackerrank, Codechef, HackerEarth, etc..
   D. Google Hangout/ Skype/ GoToMeeting video conferencing.
   E. archive.org for accessing archived resources on the web.
7. Setup and configure a new virtual machine.
8. Demonstration and Practice on archival and compression tools:
   A. Scanning and image editing tools.
   B. Audio players, recording using Mic, editing, podcast preparation.
   C. Video players, recording using webcam/camcorder, editing.
   D. Podcast, screencast, vodcast, webcasting.

Implement the following in Python: (Any **Six** activities should be carried out)

1. Basics of Python:
   A. Write a program to display the statements.
   B. Write a program to demonstrate the basic data types in python.
   C. Write a program to format string and numbers.
   D. Write a program to demonstrate the inbuilt Math function.
   E. Write a program to compute arithmetic operations taking input from the user and display the result.
   F. Write a program to translate mathematical formulae into equivalent python expressions.
   G. Write a program to demonstrate bitwise and logical operators.
   H. Write a program to swap two numbers without using a temporary variable.

2. Decision and Control Statements:
   A. Write a program to check whether the given number is even or odd.
   B. Write a program to find the largest element among the given numbers (multi-way if-elif-else statements.).
   C. Write a program to print the sum of all the even numbers in between two numbers.
   D. Write a program to display all prime numbers up to n.
   E. Write a program to print the following patterns using loop:
      ```
            *
          * *
        * * *
      * * * *
      ```
   F. Write a program to print the nth multiplication table.

3. Functions and Strings:
   A. Write a function to find the multiplication of two numbers and demonstrate the usage of parameters and arguments of a function.
   B. Write a function QUAEQU (a,b,c,x) which returns the value of the quadratic equation, discriminant, sum and product of the roots.
   C. Write a program to define a function using default arguments.
   D. Write a program to create a string and use any 6 inbuilt python functions for strings.
   E. Write a program to access characters in a given string through index operator.
   F. Write a program to traverse all the elements of string using for loop and check if two strings are anagrams or not.
   G. Write a program that takes a sentence as an input parameter and displays the number of words in it.

4. Lists:
   A. Write a program to create a list and perform the following operations:
      i. + ii. * iii. Slicing iv. del
   B. Write a program to perform any 6 built-in functions by taking any list.
   C. Write a program to create and display n x n matrix.
   D. Write a program to get a list of even numbers from a given list of numbers.(use only comprehensions)
   E. Write a program to calculate the length of each element in a list using map function in python.

5. Tuples:
   A. Write a program to create tuples (name, age, address, college) for at least two members and display the concatenation of tuples and print the first tuple n number of times.
   B. Write a program to return the top n's most frequently occurring chars and their respective counts. e.g. aaaaaabbbbcccc, 2 should return [(a 6) (b 4)].
   C. Write a program to create n iterables of varied sizes and group the values using zip function in python.

6. Sets & Dictionaries:
   A. Write a program to create two sets and perform the following operations:
      i. Union ii. Intersection iii. Difference iv. Asymmetric Difference
   B. Write a program to check whether the given set is a subset or superset of another set.
   C. Write a program to generate a dictionary that contains numbers (between 1 and n) in the form of (x,x*x).
   D. Write a program to check if a given key exists in a dictionary or not.
   E. Write a program to add a new key-value pair to an existing dictionary.
   F. Write a program to sum all the items in a given dictionary.

7. Write a program to check whether a given number has an even number of 1's in its binary representation (No control flow allowed).

Reference Books:

1. Sheetal Taneja, Naveen Kumar, *Python Programming A modular Approach with Graphics, Database, Mobile, and Web Applications*, 5th Edition, Pearson India Education Services Pvt. Ltd, 2019.
2. Ashok N Kamthane, Amit Ashok Kamthane, *Programming and Problem Solving with Python*, 1st Edition, McGraw Hill Education (India), 2018.
3. Sander van Vugt, *Beginning the Linux Command Line,* 2nd Edition, Apress Publishers, 2015.

Web References:

1. https://www.pcsuggest.com/basic-linux-commands/
2. https://www.linuxtechi.com/25-find-command-examples-for-linux-beginners/
3. https://gsuite.google.com/learning-center/products/#!/
4.https://www.techsoup.org/support/articles-and-how-tos/eleven-tips-for-troubleshooting-software
5. https://www.vmware.com/pdf/VMwarePlayerManual10.pdf