PYTHON PROGRAMMING FOR COMMUNICATION ENGINEERING APPLICATIONS LAB

Course Code:22EC1112

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Prerequisites: Signals and Systems, Analog and Digital Communications.

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

CO1: Understand the basic knowledge of Python Programming tool.(L2)

CO2: Examine different signals and compute the signal parameters.(L3)

CO3: Understand sampling process and its implications.(L2)

CO4: Analyze audio signal spectrum in frequency domain.(L4)

CO5: Understand data transmission using socket programming in python.(L2)

List of experiments:

1. Python Introduction 1 – Variables, data types

a.　Write a program to perform any 5 built-in functions by taking any list.

b.　Write a program to create tuples (name, age, address, college) for at least two members

c.　and concatenate the tuples and print the concatenate tuples.

d.　Write a program to count the number of vowels in a string using sets.

e.　Write a program to add a new key-value pair to an existing dictionary.

2. Python Introduction 2 – Control flow

a.　Write a program to display all prime numbers within an interval of 20 and 50.

b.　Write a program which creates an adder, given a value using lambda.

3. Python Introduction 3 – Functions, Arrays, Matrix operations

a.　Write a program to define a function for finding maximum of three numbers using default

b.　arguments.

c.　Write a program to add, transpose and multiply two matrices using numpy.

4. Write a program to generate basic signals: Sinusoidal and Complex exponential signals.

5. Write a program to analyse basic operations on Signals: Time shifting, Time Reversal , Amplitude scaling and Time scaling.

6. Write a program to plot the probability density function of
   a.　normal or Gaussian distribution.
   b.　Exponential distribution

7. Write a program to compute energy and power of defined signals.

8. Write a program to compute Auto correlation and cross correlation of signals.

9. Write a program to analyse the implications of Sampling theorem at variable sampling rates for a sine wave input signal.

10. Write a program to compute Fourier Series Analysis of a square wave Signal.

11. Fourier Transform of a signal:
    a.　Write a function to calculate DFT of the signal (sum of 3 sinusoidal signals) and plot the spectrum.
    b.　Verify the result using IDFT.

12. Write a program to

     a.   visualise an audio sample file(.wav) as time series data.

     b.   to identify the frequency components present in the generated audio file.

13.   a. Write a program to generate an audio signal and write the signal as .wav file format. Write python commands to read and listen to the generated audio file.

 b. Write a program to determine the correlation between generated audio signals.

14. Write a program to transmit / receive data through cloud using socket programming (Server-Client model).

Note: Any **TWELVE** of the experiments are to be conducted.

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