

ADVANCED PYTHON PROGRAMMING

(Common to CSE and CSE(DS))

Course Code: 20CS11S1

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

CO1: Apply exception handling and user defined exception(s) (L3)

CO2: Develop Module(s) and Package(s) in python (L3)

CO3: Make use of Pandas and Numpy Libraries (L4)

CO4: Implement Object Oriented concepts in programming (L3)

CO5: Apply Collection modules for the data types (L3)

LIST OF PROGRAMS:

(Any 12 programs from the following to be performed)

1) Exception Handling and User defined exception(s)

- a) Write a python program to catch following exception
 - i) Value Error
 - ii) Index Error
 - iii) Name Error
 - iv) Type Error
 - v) DivideZero Error
- b) Write a python program to create user defined exceptions.
- c) Write a python program to understand the use of else and finally block with try block.
- d) Write a python program that uses raise and exception class to throw an exception.

2) Modules and Packages

- a) Write a python program to create a module and import the module in another python program.
- b) Write a python program to import all objects from a module, specific objects from module and provide custom import name to the imported object from the module.

- c) Create a python package having at least two modules in it.
- d) Create a python package having at least one subpackage in it.

3) Numpy Library

- a) Create a numpy array from list, tuple with float type
- b) Python program to demonstrate slicing, integer and boolean array indexing
- c) Write a python program to find min, max, sum, cumulative sum of array.
- d) Write a python program to demonstrate use of ndim, shape, size, dtype.

4) Numpy Library: Linear Algebra

- a) Write a python program to find rank, determinant, and trace of an array.
- b) Write a python program to find eigenvalues of matrices
- c) Write a python program to find matrix and vector products (dot, inner, outer, product), matrix exponentiation.
- d) Write a python program to solve a linear matrix equation, or system of linear scalar equations.

5) Numpy Advanced

- a) Create a white image using NumPy in Python and
- b) Convert a NumPy array to an image and Convert images to NumPy array?
- c) Perform Sorting, Searching and Counting using Numpy methods.
- d) Write a program to demonstrate the use of the reshape() method.

6) Pandas Library

- a) Write a python program to implement Pandas Series with labels.
- b) Create a Pandas Series from a dictionary.
- c) Creating a Pandas DataFrame.
- d) Write a program which make use of following Pandas methods
 - i) describe()
 - ii) head()
 - iii) tail()

7) Pandas Library: Selection

- a) Write a program that converts Pandas DataFrame and Series into numpy.array.

- b) Write a program that demonstrates the column selection, column addition, and column deletion.
- c) Write a program that demonstrates the row selection, row addition, and row deletion.
- d) Get n-largest and n-smallest values from a particular column in Pandas dataframe

8) Pandas Library: Visualization

- a) Write a program which use pandas inbuilt visualization to plot following graphs:
 - i. Bar plots
 - ii. Histograms
 - iii. Line plots
 - iv. Scatter plots
- b) Write a program to demonstrate use of groupby() method.
- c) Write a program to demonstrate pandas Merging, Joining and Concatenating
- d) Creating dataframes from csv and excel files.

9) Object Oriented Programming: basic

- a) Write a Python class named Person with attributes name, age, weight (kgs), height (ft) and takes them through the constructor and exposes a method get_bmi_result() which returns one of "underweight", "healthy", "obese"
- b) Write a python program to demonstrate various kinds of inheritance.

10) Object Oriented Programming: advanced

- a) Write a python program to demonstrate operator overloading.
- b) Write a python program to create abstract classes and abstract methods.

11) Python Collections:

- a) Write a Python program to show different ways to create Counter.
- b) Write a Python program to demonstrate working of OrderedDict.
- c) Write a Python program to demonstrate working of defaultdict
- d) Write a python program to demonstrate working of ChainMap

12) Python collections:

- a) Write a Python program to demonstrate the working of namedtuple() and _make(), _asdict().
- b) Write a Python program to demonstrate the working of deque.

13) Regular Expressions

- a) Given an input file which contains a list of names and phone numbers separated by spaces in the following format:
 - i) Phone Number contains a 3- or 2-digit area code and a hyphen followed by an 8-digit number.
 - ii) Find all names having phone numbers with a 3-digit area code using regular expressions.
 - c) Write a python program to check the validity of a password given by the user. The password should satisfy the following criteria:
 - i) Contain at least 1 letter between a and z
 - ii) Contain at least 1 number between 0 and 9
 - iii) Contain at least 1 letter between A and Z
 - iv) Contain at least 1 character from \$, #, @
 - v) Minimum length of password: 6
 - vi) Maximum length of password: 12
 - d) Write a Python program to validate mobile number.
- 14) Write a Python program to print checkerboard pattern of nxn using numpy
- 15) Write a Python program to demonstrate working of OS Module.
- 16) Write a Python program to demonstrate working of Calendar Module.
- 17) Write a Python program using pandas that finds Missing Data and replace missing data.

REFERENCE BOOKS:

1. Martin C. Brown (Author), “*Python: The Complete Reference*” McGraw Hill Education, Fourth edition , 2018
2. R. Nageswara Rao , “*Core Python Programming*” Dreamtech Press India Pvt Ltd 2018.

WEB REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc19_cs40/preview
2. https://onlinecourses.nptel.ac.in/noc19_cs41/preview