"Education for Knowledge, Science and Culture"

-Shikshanmaharshi Dr. Bapuji Salunkhe

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Unit	Syllabus	No. of Lectures
I	**Introduction to Programming Languages:** Programming languages-their classification and characteristics, language translators and language translation activities **Planning the Computer Program:** What is program and programming paradigms Concept of problem Solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation. **Techniques of Problem Solving:** Algorithms, Flowcharting, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.	5L
II	**Building Blocks of Program:** Data, Data Types, Data Binding, Variables, Constants, Declaration, Operations on Data such as assignment, arithmetic, relational, logical or boolean, ternary, bitwise, increment or decrement operators. **Introduction to Python Programming**: Features, Structure of a Python Program(Python Shell Indentations, Comments), Python Interpreter, Writing and executing simple program, Basic Data Types: numbers(int, long, float, complex), strings, Declaring variables, Performing assignments, arithmetic operations, Sequence Control – Precedence of operators, Type conversion, Simple input-output (print(), raw_input(), input())	5L
III	**Conditional Statements:** if, if-else, nested if –else **Looping**: for, while, nested loops, else clause with while and for loop **Control statements:** Terminating loops, skipping specific conditions (break, continue, pass) **Numeric Functions:** abs(), ceil(), floor(), max(), min(), pow(), sqrt() **String Manipulation:** Declaring strings, String immutability, unicode string (u'String'), escape sequences (\), Operations on String (Concatenation (+), Repetition (*), Slicing ([index]), Range Slicing([start:end] or [:end] or [start:] , Member ship operator (in, not in)), String Functions : capitalize(), len(), lower(), swapcase(), upper()	10L

IV	**Lists:** Creating a list, Displaying list(print()), Basic Operation(Length (len()), Concatenation(+), Repetition(*), Membership (in, not in), Iteration (for var in list), Slicing, Updating(=) and deleting(del) element of a list. Compare (cmp()), Maximum(max()) and minimum (min())), List Methods (Append (list.append()), Count (list.count()), Insert object (list.insert()), Remove (list.remove(), list.pop()), Reverse (list.reverse())) **Tuples (sequence of immutable objects)** : Creating tuples(using () brackets) and Deleting tuple(del), empty tuple, Displaying(print()), Basic Operation(Length (len()), Concatenation(+), Repetition(*), Membership (in, not in), Iteration (for var in list), Slicing, Updating(=) and deleting(del) element of a list, Compare (cmp()), Maximum(max()) and minimum (min()))	10L
V	**Dictionaries –** Concept of dictionary, Creating Dictionary ({Key:Value,…}), Values are mutable objects but keys are immutable object, Properties of Dictionary keys, Basic Operation(Length (len()), Compare (cmp())), Dictionary Methods(Clear (dict.clear())), Existance of Key (dict.has_key()), List of dictionaries tuple pairs (dict.items()), List of keys (dict.keys()), Add dictionary (dict.update()), Dictionary Values (dict.values())) **Functions:** Defining Functions (def, name, arguments, : , function suite, return statement), calling a function, Pass arguments by value or by reference(using list), Advantages of functions, types of functions, function parameters(required, keyword, default), anonymous functions or ternary operator(lambda), Scope of a variable(global and local) **Modules:** Importing module, Creating & exploring modules, Math module, Random module, Time module, rules of locating module, namespace and scope (local and global), Functions for Modules (List of elements (dir()), List of Local elements (locals()), List of Global elements (globals()), Re importing module (reload()))	10L
VI	**Introduction to NumPy basics –** Creating NumPy arrays, structure and content of arrays, subset, slice , index and iterate through arrays, multidimensional arrays, python lists vs numy arrays, introduction to numpy operations on numpy arrays, operations on array basic, linear algebra operations.	5L
VII	**Introduction to pandas –** Introduction, panda basics, Pandas Series, Pandas Data Frames, Reading csv files, Reading JSON, Pandas analyzing Data, Cleaning Data : Cleaning empty cell, Cleaning wrong format, Cleaning wrong data, Removing Duplicates, Pandas Correlation, Pandas Plotting : Scatter plot, Histogram	5L

Text books:

1) Charles Dierbach, *Introduction to Computer Science using Python*, Wiley, 2013

2) James Payne , *Beginning Python: Using Python 2.6 and Python 3*, Wiley India, 2010

3) Paul Gries , Jennifer Campbell, Jason Montojo, *Practical Programming: An Introduction to omputer Science Using Python 3*, Pragmatic Bookshelf, 2/E 2014

Additional References:

1. Paul Gries , Jennifer Campbell, Jason Montojo, *Practical Programming: An Introduction to omputer Science Using Python 3*, Pragmatic Bookshelf, 2/E 2014
2. Adesh Pandey, *Programming Languages – Principles and Paradigms*, Narosa, 2008
3) A. Lukaszewski, *MySQL for Python: Database Access Made Easy*, Pact Publisher, 2010

Practical

Python Programming

Using the Operating system (logging, creating – deleting folders, creating-deleting files, using editors etc.)

(1) Installing python and setting up environment. Simple statements like printing the names, numbers, mathematical calculations, etc.
(2) Simple programs containing variable declaration and arithmetic operations
(3) Programs based on conditional constructs
(4) Programs based on loops
(5) Programs related to string manipulation
(6) Programs related to Lists, Tuples
(7) Programs related to dictionaries
(8) Programs to read & write file.
(9) Programs to do searching and sorting