

## Python Programming

| Lecture (Knowledge Criteria)                                                                                                                                                                                                                                                                                                                                                     | Practice (Performance Criteria)                                                                                                                                                                                        |
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| 3 hours/week                                                                                                                                                                                                                                                                                                                                                                     | 4 hours/week (2 hours/batch twice in a week)                                                                                                                                                                           |
| <b>Fundamental Concepts:</b><br>brief history; features; applications of python;<br>python distributions; versions; python IDEs;<br>Python interpreter;<br>Execution of python programs, debugging python<br>code; Indentation, Comments; best practices for<br>python programming;<br>Character set; tokens; keywords, variables, naming<br>rules for variables,<br>Assignment, | 1. Setup python environment<br>2. Executing python: explore different ways to<br>run python program<br>3. debug python code                                                                                            |
| <b>Basics I/O operations</b><br>Input- input (), raw_input() ; output – print (),<br>formatting output.<br><b>Datatypes</b>                                                                                                                                                                                                                                                      | 1. Code, execute and debug programs that<br>a) Use i/o statements                                                                                                                                                      |
| Scalar type: Numeric (int, long, float, complex),<br>Boolean, bytes, None; Typecasting<br><b>Operators</b><br>Arithmetic, Comparison/Relational,<br>Logical/Boolean, Bitwise; string operators;<br>Expressions and operator precedence                                                                                                                                           | b) Evaluate expressions and displays formatted<br>output<br>c) Evaluate expressions to examine the operator<br>precedence<br><br>2. Identify and resolve syntactic and semantic<br>issues in the<br>given code snippet |
| <b>Control Flow: Conditional blocks</b> If statement:<br>general format; Multiway branching; Sufficient<br>examples;                                                                                                                                                                                                                                                             | 1. Identify and Code, execute and debug<br>programs using conditional statements.<br>2. Identify and resolve syntactic and semantic<br>issues in the<br>given code snippet                                             |

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| <p><b>Control Flow: Loops</b><br/> While loop: general format; examples For loop: general format, examples. Range();nesting loops and conditionalstatements;<br/> Controlling loop execution: Break,continue, pass statements;</p>                               | <ol style="list-style-type: none"> <li>1. Code, execute anddebug programs using loops.</li> <li>2. Code, execute anddebug programs using loops and conditional statements</li> <li>3. Identify and resolve syntactic and semantic issues in the given code snippet</li> </ol>                                                                                                                                                                                                             |
| <p><b>Data Collections</b><br/> Concept of mutability<br/> Set – features, declaration, initialization, operations, comprehension;<br/> Tuple-features; declaration, initialization, basic operations; indexing; slicing; built in functions; Nested tuples;</p> | <ol style="list-style-type: none"> <li>1. Code, execute and debug programs to perform following <ul style="list-style-type: none"> <li>▪ set operations</li> <li>▪ set comprehension</li> </ul> </li> <li>2. Code, execute and debug programs to perform following <ul style="list-style-type: none"> <li>▪ basic operationson tuples</li> <li>▪ tuple indexingand slicing</li> </ul> </li> <li>3. Identify and resolve syntactic and semantic issues in thegiven code snippet</li> </ol> |
| <p><b>List</b><br/> features; declaration, initialization,basic operations; indexing;<br/> List iterations; Slicing; built infunctions; Nested Lists; Comprehensions;<br/> Applications</p>                                                                      | <ol style="list-style-type: none"> <li>1. Write code snippet toperform following onList <ul style="list-style-type: none"> <li>▪ basic operationson List</li> <li>▪ indexing andslicing</li> <li>▪ comprehension</li> </ul> </li> <li>2. Identify and resolve syntactic and semantic issues in the given code snippet</li> </ol>                                                                                                                                                          |

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| <p><b>Dictionary</b><br/> features; declaration, initialization, basic operations; indexing; adding and removing keys, iterating through dictionaries; built in functions; Comprehensions; Applications</p>           | <ol style="list-style-type: none"> <li>1. Code, execute and debug programs to perform basic operations on Dictionary</li> <li>2. Code, execute and debug programs to perform Dictionary indexing Iterating comprehension</li> <li>3. Identify and resolve syntactic and semantic issues in the given code snippet</li> </ol>                                                                                                                                                                        |
| <p><b>Arrays and Strings</b><br/> Arrays: features; create, initialize, indexing, traversal, manipulation; Strings: create, assign, indexing, builtin functions;</p>                                                  | <ol style="list-style-type: none"> <li>1. Code, execute and debug programs to perform string manipulation</li> <li>2. Code, execute and debug programs to perform array manipulation</li> <li>3. Identify and resolve syntactic and semantic issues in the given code snippet</li> </ol>                                                                                                                                                                                                            |
| <p><b>Functions</b><br/> Need of function; types; define function, calling function, function arguments; return and yield; None keyword; Scope of variables; Recursion; anonymous functions; sufficient examples;</p> | <ol style="list-style-type: none"> <li>1. Code, execute and debug programs to solve the given problem using built in functions</li> <li>2. Code, execute and debug programs to solve the given problem by defining a function</li> <li>3. Code, execute and debug programs to solve the given problem using recursion</li> <li>4. Define anonymous function and code to solve the given problem</li> <li>5. Identify and resolve syntactic and semantic issues in the given code snippet</li> </ol> |

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| <b>Modules and Packages</b><br>Why modules? Module creation; Importing modules; Module Namespace;<br>Packages: basics; path setting; Package_init .py Files;<br>Commonly used modules: Math, random; Emoji;                                                         | 1. Create Modules and Packages<br>2. Code, execute and debug programs using built in modules                                                                                                                                                                                                                                                    |
| <b>NumPy</b><br>Brief about NumPy module; NumPy arithmetic functions; NumPy array manipulation functions; NumPy statistical functions;<br><b>Pandas</b><br>Introduction, series, data frame; Create dataframes; formatting data; fundamental data frame operations; | 1. Code, execute and debug programs using NumPy module.<br>2. Code, execute and debug programs using series.<br>3. Code, execute and debug programs using dataframes.<br>4. Identify and resolve syntactic and semantic issues in the given code snippet                                                                                        |
| <b>Files</b><br>Concept; features; file operations; Opening Files; Closing Files; Writing to Files;<br>Reading to Files; File methods; Working with files using data frame.                                                                                         | 1. write code snippet to perform following operations on different types of files <ul style="list-style-type: none"> <li>▪ read file</li> <li>▪ write to file.</li> </ul> 2. Write code to perform file operations using dataframes on different file types.<br>3. Identify and resolve syntactic and semantic issues in the given code snippet |
| <b>Error and Exception Handling:</b> Python errors; exceptions: built in, user defined. How to catch exceptions?<br>Raising exceptions;                                                                                                                             | 1. Integrate exception handling into above code<br>2. Write code snippet to raise exceptions<br>3. Identify and resolve syntactic and semantic issues in the given code snippet                                                                                                                                                                 |