PYTHON PROGRAMMING		Semester	I/II
Course Code	**1BPLC105B/205B**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy (Theory and Lab hours)	40 + 24 (Practical)	Total Marks	100
Credits	4	Exam Hours	3
Examination type (SEE)	Theory		

Course outcome (Course Skill Set)

At the end of the course, the student will be able to:

CO1: Develop scripts using primitive language constructs of python.
CO2: Identify the methods to manipulate primitive python data structures.
CO3: Make use of Python standard libraries for programming.
CO4: Build scripts for performing file operations.
CO5: Illustrate the concepts of Object-Oriented Programming as used in Python.

Module-1

The way of the program: The Python programming language, what is a program? What is debugging? Syntax errors, Runtime errors, Semantic errors, Experimental debugging.

Variables, Expressions and Statements: Values and data types, Variables, Variable names and keywords, Statements, Evaluating expressions, Operators and operands, Type converter functions, Order of operations, Operations on strings, Input, Composition, The modulus operator.

Iteration: Assignment, Updating variables, the for loop, the while statement, The Collatz 3n + 1 sequence, tables, two-dimensional tables, break statement, continue statement, paired data, Nested Loops for Nested Data.

Functions: Functions with arguments and return values.

Chapters: 1.1-1.7, 2.1-2.12, 3.3, 4.4, 4.5

Number of Hours:8

Module-2

Strings: Working with strings as single things, working with the parts of a string, Length, Traversal and the for loop, Slices, String comparison, Strings are immutable, the in and not in operators, A find function, Looping and counting, Optional parameters, The built-in find method, The split method, Cleaning up your strings, The string format method.

Tuples: Tuples are used for grouping data, Tuple assignment, Tuples as return values, Composability of Data Structures.

Lists: List values, accessing elements, List length, List membership, List operations, List slices, Lists are mutable, List deletion, Objects and references, Aliasing, cloning lists, Lists and for loops, List parameters, List methods, Pure functions and modifiers, Functions that produce lists, Strings and lists, list and range, Nested lists, Matrices.

Chapter: 5.1, 5.2, 5.3

Number of Hours: 8

Module-3

Dictionaries: Dictionary operations, dictionary methods, aliasing and copying.

Numpy: About, Shape, Slicing, masking, Broadcasting, dtype.

Files: About files, writing our first file, reading a file line-at-a-time, turning a file into a list of lines, Reading the whole file at once, working with binary files, Directories, fetching something from the Web.

Chapter: 5.4, 6.1-6.5, 7.1-7.8

Number of Hours:8

Module-4

Modules: Random numbers, the time module, the math module, creating your own modules, Namespaces, Scope and lookup rules, Attributes and the dot Operator, Three import statement variants.

Mutable versus immutable and aliasing

Object oriented programming: Classes and Objects — The Basics, Attributes, Adding methods to our class, Instances as arguments and parameters, Converting an instance to a string, Instances as return values.

Chapter: 8.1-8.8, 9.1, 11.1

Number of Hours: 8

Module-5

Object oriented programming: Objects are mutable, Sameness, Copying.

Inheritance: Pure functions ,Modifiers, Generalization, Operator Overloading, Polymorphism.

Exceptions: Catching Exceptions, Raising your own exceptions.

Chapter: 11.2.2-11.2.4, 11.3.2-11.3.9, 12.1, 12.2

Number of Hours:8

PRACTICAL COMPONENTS OF IPCC

PART – A: FIXED SET OF EXPERIMENTS

1. a. Develop a python program to read 2 numbers from the keyboard and perform the basic arithmetic operations based on the choice. (1-Add, 2-Subtract, 3-Multiply, 4-Divide).

   b. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.
2. a. Develop a program to generate Fibonacci sequence of length (N). Read N from the console.

   b. Write a python program to create a list and perform the following operations
   - Inserting an element
   - Removing an element
   - Appending an element
   - Displaying the length of the list
   - Popping an element
   - Clearing the list
3. a. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.

   b. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with a suitable message.
4. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use a dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display the dictionary slice of the first 10 items.
5. Develop a program to read 6 subject marks from the keyboard for a student. Generate a report that displays the marks from the highest to the lowest score attained by the student. [Read the marks into a 1-Dimesional array and sort using the Bubble Sort technique].
6. Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(), readlines(), and write()].

CALCULUS AND LINEAR ALGEBRA		Semester	1
Course Code	**1BMATS101**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40Hours Theory + 20Hours Tutorial	Total Marks	100
Credits	4	Exam Hours	3 hrs
Examination type (SEE)	**Theory**		

Course Outcomes

CO1: Apply the concepts of multivariable calculus and vector calculus to compute derivatives, optimize functions, and analyze vector fields for applications in computer science engineering.

CO2: Solve system of linear equations and determine eigenvalues and eigenvectors using direct and iterative methods.

CO3: Apply the concepts of vector spaces and linear transformations to problems in computer science engineering.

CO4: Demonstrate the applications of computer science and allied engineering Science using modern ICT tools.

Module-1: Calculus (8Hours Theory + 4Hours Tutorial)

Partial differentiation, total derivative, differentiation of composite functions, Jacobian, Statement of Taylor's and Maclaurin's series expansion for two variables. Maxima and minima for the function of two variables.

Textbook-1: Chapter 5: Sections 5.1- 5.11

Module-2: Vector Calculus (8Hours Theory + 4Hours Tutorial)

Scalar and vector fields, Gradient, directional derivatives, divergence and curl - physical interpretation, solenoidal vector fields, irrotational vector fields and scalar potential.

Introduction to polar coordinates and polar curves.

Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between cartesian and curvilinear systems, orthogonality.

Module-3: System of Linear Equations, Eigenvalues and Eigenvectors (8Hours Theory + 4Hours Tutorial)

Elementary row transformation of a matrix, Echelon form, rank of a matrix. Consistency and solution of system of linear equations: Gauss elimination method, Gauss Jordan method. Applications: Traffic flow.

Eigenvalues and Eigenvectors, diagonalization of the matrix, modal matrix.

2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self–study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students to group learning to improve their creative and analytical skills.
6. Show short-related video lectures in the following ways:

- As an introduction to new topics (pre-lecture activity).
- As a revision of topics (post-lecture activity).
- As additional examples (post-lecture activity).
- As an additional material of challenging topics (pre-and post-lecture activity).
- As a model solution of some exercises (post-lecture activity).

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

The CIE Theory component consists of average of TWO IA tests for 25 marks and Continuous Comprehensive Assessments (CCA) for 25 marks.

- To qualify and become eligible to appear for SEE, in the **CIE**, a student must score at least **40% of 50 marks**, i.e., **20 marks**.
- To pass the **SEE**, a student must score at least **35% of 50 marks**, i.e., **18 marks**.
- Notwithstanding the above, a student is considered to have **passed the course,** provided the combined total of **CIE and SEE is at least 40 out of 100 marks**.

Continuous Comprehensive Assessments (CCA):

CCA will be conducted with a total of 25 marks. It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students. These activities should align with course objectives and promote higher-order thinking and application-based learning.

Learning Activity-1: Tutorial: Practicing problems (Two objective type assessments for 7.5 marks each (Total 15 marks).

Learning Activity-2: Choose either lab activity or seminar for 10 marks

- **Lab activity:** Execute the following lab exercises with the aid of any modern technological tool (Matlab/ Mathematica/ Scilab/ Python/ Maxima, etc).
- **Seminars:** The students has to present applications of mathematics related to syllabus as a group maximum of four members.