Sheth NKTT College of Commerce and Sheth JTT College of Arts,Thane

(Autonomous)

(Affiliated to University of Mumbai)

Credit Structure as per NEP-2020 (w.e.f. 2024-25)

F.Y. B.Sc. (Data Science)

	Semester I Subjects	Credits		Semester II Subjects	Credits
Major **BDI101** **BDD102**	1. Introduction to Programming Using Python 2. Descriptive statistics	2 2	BDR201 BDP202	1. R-Programming 2. Probability and Distribution	2 2
Major **BDIDP103**	1. Introduction to Programming Using Python Practical and Descriptive Statistics Practical	2	BDRPP203	1. R-Programming & Probability and Distribution Practical	2
Minor	-	-	BDC204	1. Calculus	2
BDA104 **BDE105**	1. OE 1: Basic Accounting and Practices 2. OE2: Business Economics	2 2	BDF205 BDD206	1. OE1: Financial Markets 2. OE2: Digital Marketing	2 2
BDO106 **BDOP107**	1. VSC: Object oriented programming 2. SEC: Object oriented Programming Practical	2 2	BDM207 BDMP208	1. VSC: Database Management System 2. SEC: Database Management System Practical	2 2

Sheth T. J. Education Society's
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Programme Name: **F.Y.B.Sc(Data Science)**	**Semester:I**
Course Category: Major	
Name of the Dept: **B.Sc (Data Science)**	
Course Title: Introduction to Programming using Python.	
Course Code:BDI101	Course Level: 4.5
Type: Theory	
Course Credit: 2	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: 1. Understand the concepts and usage data types, variables and other basic elements 2. Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples. 3. Introduce data Science Tools and plot data using appropriate Python visualization libraries.	
Course Outcomes: OC1 – Aware of the basic elements of python and Implement functions, strings, lists, tuples and dictionaries. OC2- Proficiency in using Numpy and Panda architecture for Data Science Applications.	
Description the course:	Participants will discover the fundamentals of Python syntax, data types, control structures, and functions, enabling them to write clear, concise, and efficient code. Through hands-on exercises and projects, students will develop practical programming skills and gain confidence in solving real-world problems using Python.

Syllabus: NEP 2020 w.e.f 2024-25

Unit No.	Content	Hours
I	**Introduction:** The Python Programming Language, History, features, Data Types, Variables, operators, Input and Output Operations, Control Statements. **Functions and Strings:** Defining & Calling a Function, Returning Results, Built-in Functions, Creating Strings, Functions of Strings, Working with Strings, Length of a String, Indexing & Slicing, Repeating & Concatenation of Strings. **List, Tuples and Dictionaries:** Lists, List Functions and Methods, List Operations, Tuple Functions and Methods, Tuple Operations. Creating a Dictionary, Operators in Dictionary, Dictionary Methods, Using for Loop with Dictionaries, Operations on Dictionaries.	15
II	**Introduction to NumPy:** The Basics of NumPy Arrays, Computation on NumPy Arrays: Universal Functions, Aggregations: Min, Max, and Everything In Between. Computation on Arrays: Broadcasting, Comparisons, Masks, and Boolean Logic, Fancy Indexing, Sorting Arrays, Structured Data: NumPy's Structured Arrays **Data Manipulation with Pandas**: Introducing Pandas Objects, Data Indexing and Selection, Operating on Data in Pandas, Handling Missing Data, Hierarchical Indexing, Combining Datasets: Concat and Append, Combining Datasets: Merge and Join, Aggregation and Grouping, Pivot Tables, Vectorized String Operations, Working with Time Series. High-Performance Pandas: eval( ) and query( )	15
	Total Hours	30

References:

1. 1. Think Python Allen Downey O'Reilly 1 st 2012
2. Introduction to Problem Solving with Python E. Balagurusamy TMH 1 st 2016
3. Let Us Python Y. Kanetkar, BPB 1 st 2019
4. Python Data Science Handbook Jake VanderPlas O'Reilly Media 1 st 2016

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Programme Name: **F.Y.B.Sc(Data Science)**	**Semester: I**
Course Category/Vertical: Major	
Name of the Dept: **B.Sc (Data Science)**	
Course Title: **Descriptive Statistics**	
Course Code: BDD102	Course Level: 4.5
Type: Theory	
Course Credit: 2	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives(CO): 1. This course will enable the students to combine practical & theoretical knowledge of Statistics. 2. It will provide fundamental basic knowledge of statistical techniques as applicable for data analysis.	
Course Outcomes (OC): OC1. Organize data using frequency distributions, graphically using histograms,frequency polygons. Calculate central tendencies like mean, median and mode and recognize the applicability in Data Analysis. OC2. Apply various measures of dispersion. Understand covariance, correlation and regression.	
Description the course:	It provides basic knowledge of statistical techniques as applicable in Accounting and Finance. Course provides statistical literacy, Essentials for conducting research effectively, proficiency in course can enhance career prospects in numerous fields. Provides a foundation for lifelong learning in data analysis and statistical reasoning are continuously evolving.

Syllabus: NEP 2020 w.e.f 2024-25

Unit No.	Content	Hours
I	**INTRODUCTION, ORGANISING, DATA, FREQUENCY DISTRIBUTION, DATA REPRESENTATION** Organizing Data, Frequency Distribution, Measure of Central tendency, Org Data, preparation of frequency distribution graphical and diagrammatic representation histogram, frequency polygon. **MEASURES OF CENTRAL TENDENCIES** Definition of Averages and objective of Averages Types of Averages. Arithmetic mean, Geometric Mean, Harmonic Mean and its advantages, Disadvantages and usages, mode, median, quartiles, deciles and percentiles for both grouped as well as ungrouped data.	15
II	**MEASURES OF DISPERSION** Concept and idea of dispersion. Various measures Range, quartile deviation, Mean Deviation, Standard Deviation and corresponding relative measure of dispersion. Geographical representation and utility of various is measure of Dispersions. **CO-VARIANCE, CORRELATION AND REGRESSION** Meaning, definition and Application of covariance, concept of correlation. Rank correlation, regression concept, relationship with correlation, Method od Least squares.	15
	Total Hours	30

References:

1. Statistical Methods, An Introductory Text, MedhiJ. New Age International Ltd. Second Edition
2. Basic Statistics Agarwal B.L. New Age International Ltd.
3. Theory and Problems of Statistics, Spiegel M.R. Tata McGraw- Hill.
4. Fundamentals of Statistics , Volume II Goon A.M., Gupta M.K., Das gupta B. The World Press Private Limited, Calcutta.
5. Excel Data Analysis Modeling and simulation Hector Gurrero Springer Second Edition
6. Data Analysis and Decision Making Albright, Wilston, Zappe Thomson

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Programme Name: **F.Y.B.Sc(Data Science)**	**Semester: I**
Course Category/Vertical: Major	
Name of the Dept: **B.Sc (Data Science)**	
Course Title: **Introduction to Programming using Python/Descriptive Statistics Practical**	
Course Code:BDIDP103	Course Level: 4.5
Type: Practical	
Course Credit: 2	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	

Course Objectives(CO):

1. To learn about special operators, Arrays and lists and operation on them in Python.
2. To explore Dictionaries, Sets, Text processing and operation on them.
3. To understand Data Conversion, data categorization, selection of appropriate data category and Collection and to utilize excel based data modeling skills
3. To compute Logical and Mathematical Averages, measures of dispersion, compute skewness,
   moments and kutosis and to use graph from graphical tool

Course Outcomes (OC):

OC1. Knowledge about input and output functions in python and have ability to use loops and control their execution

OC2. Ability to develop modular Programs using functions and data types like string, array and list of Python

OC3. Use Microsoft Excel for business and data analytics, applying insert function library, make use of "Add-Ins Tool pack" for different statistical and mathematical function, learn to use formula and function with cell reference and able to use different types of chart suitable to the data

OC4. Do Data Entry and manipulation using data context, to transpose the tabular data, convert data in to tabular format and able to use the excel tools for data categorization

Syllabus: NEP 2020 w.e.f 2024-25

Sr. No.	Content	Hours
I	**Introduction to Programming using Python**	
1	**Write the program for the following:**	
a	Enter the number from the user and depending on whether the number is even or odd, print out an appropriate message to the user.	
b	Write a program to generate the Fibonacci series.	
2	**Write the program for the following:**	
a	Write a function that reverses the user defined value.	
b	Write a function to check the input value is Armstrong and also write the function for Palindrome.	
c	Write a recursive function to print the factorial for a given number.	
3	**Functions**	
a	Write a Python program to define and use functions	
b	Write a Python program to demonstrate the use of Built-in Functions.	
4	**Strings**	
a	Write a Python Program to demonstrate operations and properties of string data types	
b	Write a Python Program implement and demonstrate the use of Membership operators and Identity operators	
5	**List**	
a	Write a Python Program to create list, apply various functions to it.	
b	Write a Python Program to demonstrate concept of aliasing and cloning	
6	**Tuples**	
a	Write a Python Program to implement tuples for storing data. Verify the immutability property on tuples	
7	**Dictionaries**	
a	Write a Python Program to implement Dictionary and operations on dictionaries	
b	Write a Python script to sort (ascending and descending) a dictionary by value.	
c	Write a Python script to concatenate following dictionaries to create a new one. Sample Dictionary : dic1={1:10, 2:20} dic2={3:30, 4:40} dic3={5:50,6:60} Expected Result : {1: 10, 2: 20, 3: 30, 4: 40, 5: 50, 6: 60}	
d	Write a Python program to sum all the items in a dictionary.	
8	**Using the NumPy Package**	
a	Programs using NumPy Package and different functions available in it.	
9	**Arrays**	

a	Write a Python Program to implement arrays for storing homogeneous data items. Apply indexing and slicing operations to access elements of array.	
10	**Using the pandas package**	
a	Programs using Pandas Package and different functions available in it.	
II	**Descriptive Statistics**	
1.	**Introduction to Excel**	
a.	Understanding Data Tools , Understanding Formula Tools ,insert functional library using insert function	
b.	Add-Ins Analysis Tool packs	
2.	**Using Formulae and Charts**	
a.	Formula writing, Functions ,using Cell reference	
b.	Understanding Insert Tool : Chart Tools, Different types of charts and their use	
3.	**Data Entry and manipulation**	
a.	DataConversionwiththeLogicalIF,VLOOKUP,HLOOKUP.Pivottable,Pivotchart	
b.	Data Queries with Sort, Filter and Advanced Filter Exact function data entry comparison	
4.	**Data Validation**	
a.	Specifying a valid range of values for a cell	
b.	Specifying a list of valid values for a cell	
5.	**Measures of central tendency**	
a.	Calculating Mean, Median, Mode, Minimum, Maximum, range with cell reference	
b.	Using Summary statistics	
6.	**Measures of Dispersion**	
a.	Calculate Range, Quartile Deviation, Mean absolute deviation, Standard deviation with cell reference	
b.	Using Summary statistics	
7.	**Graphical Presentation with Excel-1**	
a.	Producing a Histogram	
b.	Producing a Polygon	
8.	**Graphical Presentation with Excel–2**	
a.	Producing a bar chart of subgroups of data	
b.	Peratochart	
9.	**Correlation**	
a.	Use of formula for calculating correlation and Co-variance.	

10.	**Regression analysis**	
a.	Linear Regression and visual analysis(Chart)	
	Total Hours	30

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Programme Name: **F.Y.B.Sc(Data Science)**	**Semester: I**
Course Category/Vertical: Open Elective1	
Name of the Dept: **B.Sc (Data Science)**	
Course Title: Basics Accounting and Practices	
Course Code:BDA104	Course Level: 4.5
Type: Theory	
Course Credit: 2	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: 1. To make learner familiar with Basic concept and Terminology of accounting 2. To make learner familiar with Financial Statement Analysis and Interpretation with ratio	
Course Outcomes (OC): OC1.The learner will understand the basic concept of Accounting , Convention, Inventory Valuation & Final accounting OC2.The learner will be able to understand Ratio computation and the financial statement interpretation and Analysis	
Description the course:	The course introduces learners to the basic concepts of Accounting Fundamentals required in Implementation of accounting It will assist them in making better understating of accounting principles and conventions with analysis of Vertical financial statement. The course will inculcate effective accounting and analytical skills in learners enabling them to interpret and conclude Business opportunity through solid capital collection from public at Large in the corporate world which enable them to serve as accountant, financial analysis, Financial managers etc.

Syllabus: NEP 2020 w.e.f 2024-25

Unit No.	Content	Hours
I	**Introduction to Basic of accounting in Going Concern** 1.Introducation and Definition of Accounting 2.Objectives, Convention and Scope of Basics of Accounting 3.Journal Entry, Transaction and Double entry Book System 4.Taial balance, Preparation Trading account, Profit & Loss account and Balance sheet 5.Inventory Valuation – (Meaning, Scope and Methods-FIFO Method and Weighted Average Method)	15
II	**Financial Statement analysis and Interpretation** 1.Introducation of Financial Statement Analysis & Interpretation 2. Vertical Form of Financial statement –(Profit & Loss a/c and Balance sheet) 3.Trend Analysis of Financial Statement 4.Comparative and Common size analysis of Financial statement 5.Ratio Analysis	15
	Total Hours	30

Reference Books

1. Introduction to Accountancy by T.S. Grewal, S. Chand and Company (P) Ltd., New Delhi
2. Advance Accounts by Shukla and Grewal, S. Chand and Company (P) Ltd., New Delhi
3. Financial Accounting by P.C. Tulsian, Pearson Publications, New Delhi
4. Introduction to Financial Accounting ,Manan Prakashan Aniapure
5. Introduction to Financial Accounting ,Vipul Publication
6. Financial Management-Tulsian

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Programme Name: F.Y.B.Sc(Data Science)	**Semester: I**
Course Category: Open Electives (OE)	
Name of the Dept: **B.Sc (Data Science)**	
Course Title: **Business Economics**	
Course Code: BDE105	Course Level: 4.5
Type: Theory	
Course Credit: 2 credits	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: 1: To make learners familiar with basic concepts in Microeconomics 2: To make learners aware about concepts of Macroeconomics	
Course Outcomes: OC1: Learners will understand basic concepts in microeconomics OC2: Learners will understand the concepts of macroeconomics.	
Description the course:	Studying microeconomics and macroeconomics as part of a data science curriculum provides students with a strong foundation in understanding how economic principles influence individual decision-making and overall market behavior. integrating microeconomics and macroeconomics into a data science curriculum provides students with a comprehensive understanding of how economic factors influence data trends, decision-making processes, and business outcomes.

Syllabus: NEP 2020 w.e.f 2024-25

Unit No.	Content	Hours
I	**Introduction to Microeconomics:** Meaning, Definitions of Economics, Basic Concepts of Microeconomics Functional Relations and Tools for Economic Analysis The basics of Market Demand, Market Supply& Equilibrium Price Concepts of Costs and Revenue Market Structure – Perfect Competition, Monopoly, Monopolistic Competition & Oligopoly	15
II	**Introduction to Macroeconomics** Meaning, Scope, Importance & Limitations of Macroeconomics National Income – Concepts of National Income, Circular flow of National income Trade Cycle – Features, Types & Phases Monetary Policy -Objectives, Instruments &Role of Monetary Policy in Developing Economies Fiscal Policy - Objectives, Instruments &Role of Fiscal Policy in Developing Economies Inflation – Meaning, Demand Pull Inflation & Cost push Inflation, Measures to control Inflation.	15
	Total Hours	**30**

References:

1. N. Gregory Mankiw, (2015), "Principles of Microeconomics" 7th edition- Cengage Learning.
2. Sen Anindya, (2007), "Microeconomics Theory and Applications" Oxford University press, New Delhi.
3. Salvator D, (2003) "Microeconomics Theory and Applications" Oxford University press, New Delhi.
4. Richard Froyan, (2012), Macroeconomics: Theories and Policies, Person Education
5. Eroll D'souza, (2008) Macroeconomics, Pearson Education.
6. Suman Kalyan Chakravarty, (2010), Macroeconomics, Himalaya Publishing House.

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Programme Name: **F.Y.B.Sc(Data Science)**	**Semester: I**
Course Category/Vertical: Vocational Skill Course	
Name of the Dept: **B.Sc (Data Science)**	
Course Title: Object Oriented Programming with C++	
Course Code: BDO106	Course Level: 4.5
Type: Theory	
Course Credit: 2 credits	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	

Course Objectives(CO):

1. Be able to explain the difference between object oriented programming and procedural programming and program using more advanced C++ features such as composition of objects, operator overloads, inheritance and polymorphism, file I/O, exception handling, etc.
2. Concept of classes and objects, constructors and destructors, Polymorphism and virtual functions.

Course Outcomes (OC):

OC 1. Understand the concept of OOPs, feature of C++ language, apply various types of Datatypes, Operators, Conversions while designing the program.

OC 2. Understand and apply the concepts of Classes & Objects, friend function, constructors & destructors in program design, various forms of inheritance

OC 3. Apply & Analyze operator overloading, runtime polymorphism, Generic Programming

Description the course:	OOP offers distinct advantages. It encourages modular objects for reusable code, ensures well-organized and maintainable code via encapsulation, inheritance, and polymorphism, allowing flexibility and easy updates. Additionally, OOP models real-world scenarios, enhancing system understanding.

Unit No.	Content	Hours
I	1. Object Oriented Methodology: Introduction, Advantages and Disadvantages of Procedure Oriented Languages, Application of OOPS, Principles of OOPS: Objects, Classes, Data Abstraction and Data Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing. 2. Classes and Objects: Simple classes (Class specification, class members accessing), Defining member functions, passing object as an argument, Returning object from functions, friend classes, friend function. 3. Constructors and Destructors: Introduction, Default Constructor, Parameterized Constructor and examples, Destructors. 4. Program development using Inheritance: Introduction, Advantages provided by inheritance, choosing the access specifier, Derived class declaration, multiple inheritance, multilevel inheritance, hybrid inheritance.	15
II	1. Polymorphism: Concept of function overloading, overloaded operators, overloading unary and binary operators. 2. Exception Handling: Introduction, Exception Handling Mechanism, Concept of throw & catch with example. 3. Working with Files: Introduction, File Operations, Various File Modes, File Pointer and their Manipulation.	15
	Total Hours	30

References:

1 Object Oriented Programming in C++ E, Balagurusamy

2 Object-Oriented Programming in C++ , Robert Lafore

3 Object-oriented Programming C++ , Hari Mohan Pandey

4 C++ Programming: An Object-Oriented Approach Behrouz A. Forouzan, Richard F. Gilberg

5 C++ How to Program, Paul Deitel, Harvey Deitel

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Sheth N.K.T.T College of Commerce and
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Programme Name: **F.Y.B.Sc(Data Science)**	**Semester: I**
Course Category/Vertical: Skill Enhancement Course	
Name of the Dept: **B.Sc (Data Science)**	
Course Title: Object Oriented Programming with C++ Practical	
Course Code:BDOP107	Course Level: 4.5
Type: Theory	
Course Credit: 2 credits	
Hours Allotted: 60 Hours	
Marks Allotted: 50 Marks	
Course Objectives(CO): 1. Be able to explain the difference between object oriented programming and procedural programming and program using more advanced C++ features such as composition of objects, operator overloads, inheritance and polymorphism, file I/O, exception handling, etc. 2. Concept of classes and objects, constructors and destructors, Polymorphism and virtual functions.	
Course Outcomes (OC): OC 1. Understand the concept of OOPs, feature of C++ language, apply various types of Datatypes, Operators, Conversions while designing the program. OC 2. Understand and apply the concepts of Classes & Objects, friend function, constructors & destructors in program design, various forms of inheritance OC 3. Apply & Analyze operator overloading, runtime polymorphism, Generic Programming	
Description the course:	OOP offers distinct advantages. It encourages modular objects for reusable code, ensures well-organized and maintainable code via encapsulation, inheritance, and polymorphism, allowing flexibility and easy updates. Additionally, OOP models real-world scenarios, enhancing system understanding.

Unit No.	Content	Hours
I	1. a. Write a C++ program to create a simple calculator. b. Write a C++ program to convert seconds into hours, minutes and seconds. c. Write a C++ program to find the volume of a square, cone, and rectangle. 2. a. Write a C++ program to find the greatest of three numbers. b. Write a C++ program to find the sum of even and odd n natural numbers c. Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user 3. a. Write a C++ program using classes and object Student to print name of the student, roll_no. Display the same. b. Write a C++ program for Structure bank employee to print name of the employee, account_no. & balance. Display the same also display the balance after withdraw and deposit c. Design the class Demo which will contain the following methods: readNo(), factorial() for calculating the factorial of a number, reverseNo() will reverse the given number, isPalindrome() will check the given number is palindrome, isArmstrong() which will calculate the given number is armStrong or not. WherereadNo() will be private method. d. Write a program to demonstrate function definition outside class and accessing class members in function definition. 4. a. Write a friend function for adding the two complex numbers, using a single class b. Write a friend function for adding the two different distances and display its sum, using two classes. c. Write a friend function for adding the two matrix from two different classes and display itssum d. Write a Program to find Maximum out of Two Numbers using friend function. Note: Here one number is a member of one class and the other number is member of some other class. II 5. a. Design a class Complex for adding the two complex numbers and also show the use of constructor. b. Design a class Geometry containing the methods area() and volume() and also overload the area()function c. Design a class StaticDemo to show the implementation of static variable and staticfunction d. Write a C++ program to overload new/delete operators in a class.	15

	e. Write a C++ Program to generate Fibonacci Series by using Constructor to initialize the Data Members. 6. a. Overload the operator unary(-) for demonstrating operator overloading b. Overload the operator + for adding the timings of two clocks, And also pass objects as an argument. c. Overload the + for concatenating the two strings. For e.g "Py" +"thon" =Python 7. a. Implement the concept of method overriding. b. Show the use of virtual function c. Show the implementation of abstract class. 8. a. Write a C++ Program that illustrate single inheritance. b. Write a C++ Program that illustrate multiple inheritance. c. Write a C++ Program that illustrate multi-level inheritance. d. Write a C++ Program that illustrate Hierarchical inheritance. 9. a. Show the implementation of exception handling b. Show the implementation for exception handling for strings c. Show the implementation of exception handling for using the pointers. 10. a. Design a class FileDemo open a file in read mode and display the total number of words and lines in the file. b. Design a class to handle multiple files and file operations 2. c. Design a editor for appending and editing the files	
II	3. a. Write a C++ program to create a simple calculator. b. Write a C++ program to convert seconds into hours, minutes and seconds. c. Write a C++ program to find the volume of a square, cone, and rectangle. 2. a. Write a C++ program to find the greatest of three numbers. b. Write a C++ program to find the sum of even and odd n natural numbers c. Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user 3. a. Write a C++ program using classes and object Student to print name of the student, roll_no. Display the same. b. Write a C++ program for Structure bank employee to print name of the employee, account_no. & balance. Display the same also display the balance after withdraw and deposit	15

	c. Design the class Demo which will contain the following methods: readNo(), factorial() for calculating the factorial of a number, reverseNo() will reverse the given number, isPalindrome() will check the given number is palindrome, isArmstrong() which will calculate the given number is armStrong or not. WherereadNo() will be private method. d. Write a program to demonstrate function definition outside class and accessing class members in function definition. 4. a. Write a friend function for adding the two complex numbers, using a single class b. Write a friend function for adding the two different distances and display its sum, using two classes. c. Write a friend function for adding the two matrix from two different classes and display itssum d. Write a Program to find Maximum out of Two Numbers using friend function. Note: Here one number is a member of one class and the other number is member of some other class. 5. a. Design a class Complex for adding the two complex numbers and also show the use of constructor. b. Design a class Geometry containing the methods area() and volume() and also overload the area()function c. Design a class StaticDemo to show the implementation of static variable and staticfunction d. Write a C++ program to overload new/delete operators in a class. e. Write a C++ Program to generate Fibonacci Series by using Constructor to initialize the Data Members. 6. a. Overload the operator unary(-) for demonstrating operator overloading b. Overload the operator + for adding the timings of two clocks, And also pass objects as an argument. c. Overload the + for concatenating the two strings. For e.g “Py” +“thon” =Python 7. a. Implement the concept of method overriding. b. Show the use of virtual function c. Show the implementation of abstract class. 8. a. Write a C++ Program that illustrate single inheritance. b. Write a C++ Program that illustrate multiple inheritance. c. Write a C++ Program that illustrate multi-level inheritance. d. Write a C++ Program that illustrate Hierarchical inheritance. 9. a. Show the implementation of exception handling b. Show the implementation for exception handling for strings	

	c. Show the implementation of exception handling for using the pointers. 10. a. Design a class FileDemo open a file in read mode and display the total number of words and lines in the file. b. Design a class to handle multiple files and file operations 1. c. Design a editor for appending and editing the files	
	Total Hours	60

Sheth T. J. Education Society's
Sheth N.K.T.T College of Commerce and
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Programme Name F.Y.B.Sc(Data Science)	**Semester: I**
Course Category/Vertical: Ability Enhancement Course	
Name of the Dept: **B.Sc (Data Science)**	
Course Title: Corporate Communication	
Course Code: BDC108	Course Level: 4.5
Type: Theory	
Course Credit: 2 credits	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives (CO): 1. To inculcate the knowledge of basic communication skills in learners and make learners aware of how non-verbal communication impacts daily communication. 2. To inculcate effective business writing skills in learners and create awareness about ethics in information	
Course Outcomes (OC): OC1: Learners would develop their basic communication skills and gain knowledge of how verbal and non-verbal communication impacts the business world. OC2: Develop effective business writing skills	
Description the course:	The course introduces learners to the basic concepts of communication required in personal and professional lives. It will assist them in making effective use of both verbal and non-verbal methodologies of communication. The course will inculcate effective writing skills in learners enabling them to overcome the communication challenges they may face in the corporate world. With these skills they can turn out to be communication experts and PR experts as well.

Unit No.	Content	Hours
I	**Fundamentals of Technical Communication** **Fundamentals of Technical Communication:** Introduction, The process of communication, Language as tool of communication, levels of communication, The flow of communication, Communication Networks, The importance of technical communication **Barriers to communication**: Definition of Noise, classification of Barriers **Non-verbal Communication**: Introduction, Definition, significance of nonverbal, forms of non-verbal communication, types of non-verbal communication **The Seven Cs of Effective Communication:** Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness **Meeting and conferences**: Introduction, Purpose of Meeting, planning a meeting, Meeting Process, Leading effective meeting, evaluating meeting, planning conference, teleconferencing. **Group Discussion and team presentation**: Introduction, Benefits of GD, Workplace GD guidelines, Functional and non-functional roles in GD, Improving group performance, Assessment of group discussion, Team presentation. **Email communication**: Introduction, Advantages of email, problems in email communication, Email etiquettes, Techniques of writing Effective Email	15
II	**Business Writing and Visual Aids** **Business writing**: Introduction, Importance of written Business, Five main strategies of writing business messages **Business correspondence**: Business letter writing, common component of Business letter, Strategies for writing body of a letter, Types of Business letter, writing memos. **Business reports and proposal**: What is a report? Steps in writing routine Business report, parts of reports, corporate reports and Business proposals	15

	Careers and Resume: Introduction to career building, resume format, traditional, electronic and video resumes, sending resume, follow-up letters and online recruitment process. **Creating and Using Visual Aids**: Object, Models, Handouts, Charts and Graphs, Text Visuals, Formatting Computer generated charts, graphs and visuals.	
	Total Hours	30

References:

1. Technical communication: principles and practices Meenakshi Raman & Sangeeta Sharma Oxford Higher Education
2. Business Communication Meenakshi Raman & Prakash Singh Oxford- Higher Education 2nd edition 2006
3. Effective Business Communication Herta Murphy, Herbert Hildebrandt, Jane Thomas Tata McGraw Hill 7th edition 2008
4. Professional Communication Aruna Koneru McGraw Hill 2008
5. Business and Professional Communication Plans, Processes and Performance James R. DiSanza Nancy J..Legge Pearson Education 4 th Edition
6. Storytelling with data-a data visualization guide for business professionals Cole Nussbaumer knaflic Wiley

Sheth T. J. Education Society's
Sheth N.K.T.T College of Commerce and
Sheth J.T.T College of Arts, Thane (W

Programme Name: **F.Y.B.Sc(Data Science)**	**Semester:I**
Course Category/Vertical: Value Education Course	
Name of the Dept: **B.Sc (Data Science)**	
Course Title: **Green Technology I**	
Course Code: BDG109	Course Level: 4.5
Type: Theory	
Course Credit: 2 credits	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives(CO): 1.Understand the concept of Green IT and impact of sustainability of computing applications, regulatory, non regulatory and other influences affecting business. 2.Understand Key sustainability challenges associated with data centers and strategies to make them more environmentally sustainable with in-depth coverage of energy-efficient storage technologies and data storage systems.	
Course Outcomes (OC): 1. OC 1. The learner studies emerging green IT regulations,energy management techniques, laws, standards and regulations related to Green IT. OC 2. Develop knowledge about green data storage and data centers and how the choice of hardware and software can facilitate a more sustainable operation.	
Description the course:	The course introduces the learners to the concept of sustainable approach to IT resource management, focusing on minimizing environmental impact in the context of environmental concerns.The learners could upgrade their current understanding towards Green IT practices, reducing energy consumption and electronic waste, promoting efficient, cost-effective, and environmentally sustainable IT systems.Students would be able to explore new areas of IT professionals with expertise in Green IT.

Syllabus: NEP 2020 w.e.f 2024-25

Unit No.	Content	Hours
I	**Green IT An Overview** •Introduction, Environmental Concerns and Sustainable Development, Environmental Impacts of IT, Green IT, Applying IT for Enhancing Environmental Sustainability, Green IT Standards and Eco-Labelling of IT. •**Green Devices and Hardware** : Introduction, Life Cycle of a Device or Hardware, Reuse, Recycle and Dispose, Green Software ,Energy-Saving Software Techniques, •**Sustainable Software Development** : Introduction, Current Practices, Sustainable Software, Software Sustainability Attributes and Metrics Sustainable Software Methodology •**Regulating Green IT:** Laws, Standards and Protocols: Introduction, Introduction, Nonregulatory Government Initiatives, Industry Associations and Standards Bodies, Green Building Standards, Green Data Centres, Social Movements and Greenpeace	
II	•**Green Data Storage**: Introduction, Storage Media Power Characteristics, Energy Management Techniques for Hard Disks, System-Level Energy Management. Green Data Centres : Data Centres and Associated Energy Challenges, Data Centre IT Infrastructure, Data Centre Facility Infrastructure: Implications for Energy Efficiency, IT Infrastructure Management, Green Data Centre Metrics	
	Total Hours	30

References:

1.Green IT Toby Velte, Anthony Velte, & Robert Elsenpete McGraw Hill 2008

2. Harnessing Green It Principles And Practices San Murugesan, G.R. Gangadharan WILEY -

3. Green Data Center: Steps for the Journey Alvin Galea, Michael Schaefer, Mike Ebbers Shroff Publishers And Distributors 2011

4. Green Computing and Green IT Best Practice Jason Harris Emereo

5. Green Computing Tools and Techniques for Saving Energy, Money and Resources Bud E. Smith CRC Press 2014

Sheth T. J. Education Society's
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Sheth J.T.T College of Arts, Thane (W)

Programme Name: **F.Y.B.Sc(Data Science)**	**Semester:I**
Course Category: Inidan Knowledge System	
Name of the Dept: **B.Sc (Data Science)**	
Course Title: Evolution of Information Technology	
Course Code: BDK110	Course Level: 4.5
Type : Theory	
Course Credit: 2	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: 1. Make aware to Basics of Computer and various storage devices 2. Concept of Hardware, Software and Networking devices. 3. To study IT Act 2000	
Course Outcomes: co1 - Study generations of Computer and basics of Internet and it applications co2 - Understand various software types and Basics of I.T. Act 2000	
Description the course:	Through this course, learners will embark on a fascinating exploration of the historical milestones, key innovations, and transformative trends that have shaped the IT landscape. From early mechanical computing devices to the advent of the internet, mobile computing, and artificial intelligence, participants will gain valuable insights into how IT has revolutionized communication, commerce, and daily life.

Syllabus: NEP 2020 w.e.f 2024-25

Unit No.	Content	Hours
I	**Computer Generation and its classification**: Introduction, What is Computer, Characteristics of computer, Evolution of Computer, Block Diagram of a computer, Generations of Computers. **Storage Devices:** Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives **Software:** Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language, advantages & disadvantages of programming language. Application S/W and its types	15
II	**Communication:** Introduction, Communication Types (modes), Data Transmission Medias, Modem and its working, characteristics, Types of Networks, Topologies, Computer Protocols. **Internet and the World Wide Web:** What is Internet? Evolution of Internet, Internet service providers, Internet and its applications, E-mail, Telnet, FTP, domain name server, Internet address, World Wide Web (WWW): World Wide Web uniform resource locator (URL), Browsers–Internet Explorer, Netscape Navigator, Opera, Firefox, Chrome, Mozilla. **I.T. Act 2000:** Introduction of IT Act 2000, Offences in IT Act 2000, Various provisions of IT Act 2000.	15
	Total Hours	30

References:

1. Fundamentals of Computers V. Rajaraman and Neeharika A. PHI Learning Sixth 2015
2. Data communication and networking Behrouz. Forouzan Tata McGraw Hill 5th edition 2013
3. Cyber law simplified Vivek Sood Tata McGraw Hill

Scheme of Examination

Course with Credit	External Examination	Internal Examination	Total
Credit 4	**60 marks**	**40 marks**	**100 marks**
Credit 2	**30 marks**	**20 marks**	**50 marks**

Internal Examination Structure(Theory)

Internal examination	**40 marks**	**20 marks**
Project Presentation/Case Study /Quiz/Group Discussion	10 marks	5 marks
Assignment /Active class Participation/Attendance	10 marks	5 marks
Class test	20 marks	10 marks
Total	40 marks	20 marks

Structure for Class Test

For 10 marks	
Q1. Answer the following (Attempt any 2) **a.** **b.** **c.** **d.**	**10 Marks**

External Examination (For 60 Marks)

Q. No.	External	Marks: 60
Q .1 (From Module 1)	Answer the following questions (Any 3) A B	15 Marks

	C D E F	
Q. 2 (From Module 2)	Answer the following questions (Any 3) A B C D E F	15 Marks
Q. 3 (From Module 3)	Answer the following questions (Any 3) A B C D E F	15 Marks
Q. 4 (From Module 4)	Answer the following questions (Any 3) A B C D E F	15 Marks

External Examination (For 30 Marks)

Q. No.	External	Marks: 30
Q .1 (From Module 1)	Answer the following questions (Any 3) A B C D E F	15 Marks
Q. 2 (From Module 2)	Answer the following questions (Any 3) A B C D E F	15 Marks

Practical Evaluation Internal: 20 marks

1	Problem Solving	10
2	Lab Work/Performance	5
3	Viva	5

Practical External Exam: 30 marks
A Certified copy journal is essential to appear for the practical examination.

1	Practical Question 1	10
2	Practical Question 1	10
3	Journal	5
4	Viva Voce	5

OR

1	Practical Question 1	20
2	Journal	5
3	Viva Voce	5

Members of Department of Science and Technology (B.Sc. IT)

Name	Designation	Signature
1. Dr. Yogeshwari Patil	Chairperson	
2. Dr. Hiren Dand	Expert nominated by Vice Chancellor	
3. Prof. Mohan Bonde.	Subject experts from outside the parent university nominated by the Academic Council	
4. Ms. Manasi Vaidya	Subject experts from outside the parent university nominated by the Academic Council	
5. Mr. Vikesh Jha	Representative from the industry	
6. Mr. Hrushikesh Jadhav.	Member of College Alumni	
7. Dr. Manisha Nehete.	Member	
8. Mrs. Sonali A. Saraf	Member	
9. Mrs. Vrushali Ghodke	Member	
10. Mr. Kiran More.	Member	

11.Mrs. Sneha Gupta	Member	
12.Ms. Aafreen Shaikh.	Member	
13.Mr. Shravan Mishra	Member	
14.Ms. Nayana Lagade	Member	
15.Mr. Nilesh Pandey	Member	
16.Ms. Priyanka Rajput	Member	