SAVITRIBAI PHULE PUNE UNIVERSITY

PUNE

CHOICE BASED CREDIT SYSTEM

for

B.Sc. (Information Technology)

(Implemented from June 2022)

Savitribai Phule Pune University

B. Sc. (Information Technology)

(To be implemented from Academic year 2022-2023)

1. Name of Program: B.Sc. (Information Technology)

2. No. of students per division: 80

3. Introduction:

A **Bachelor of Science in Information Technology**, (abbreviated **BSc IT**), is a bachelor's Degree awarded for an undergraduate programme in the Information Technology field. BSc IT syllabus primarily focuses on subjects like software development, software testing, software engineering, web design, databases, programming, computer networking and computer systems designed to impart theoretical and practical knowledge on storing, processing, and managing information securely.

Generally, software and information technology companies look for people who have strong programming skills, system analysis, and software testing skills. Information technology as a field emphasizes on secure management of large amounts of variable information and its accessibility via a wide variety of systems.

Graduates with an IT background are able to perform technology tasks relating to the processing, storing, and communication of information between computers, mobile phones, and other electronic devices. They can become professionals with analytical and logical thinking abilities required to solve real-time problems in the IT field. They acquire knowledge to identify problems in the IT and infrastructure, analyze them and also find solutions for the same.

B.Sc.(IT) is an undergraduate course of Three Years divided into six semesters. It is a Full-Time Degree Program. The program will be based on the Choice-based credit system comprising 140 credit points.

4. Objectives:

- To strengthen the basics of the subject useful in selecting various career options.
- To prepare students to meet the information and communication technology needs of private and government organizations.

- To make the students industry ready by teaching them to apply the technologies in various fields of IT, including Mobile applications, Web site development and management, databases, and computer networks.

5. Programme Outcomes:

- Understand the basic concepts of programming, databases, and networking.
- Acquire problem solving skills and design, and analyze algorithms.
- Ability to work in teams as well as individual to build software systems and to use a range of programming languages and tools to develop computer programs to solve problems effectively.
- Ability to communicate effectively in both verbal and written form in industry.
- Ability to select appropriate techniques to tackle and solve problems in the discipline of information security management.

6. Eligibility:
- Higher secondary school certificate (10+2) Science or its equivalent examination with English

OR

- Three-year diploma course from the board of technical education conducted by Government of Maharashtra or its equivalent

OR

- Higher secondary school certificate (10+2) Examination with English and a vocational subject of +2 level (MCVC)

Proposed Structure of B.Sc.(Information Technology)

SEMESTER I

Course Type	Course Code	Paper Title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
CC	IT-111	Problem Solving using Python	4	-	30	70	100
CC	IT-112	Fundamentals of Databases	4	-	30	70	100
CC	IT-113	Mathematical Techniques for IT	4	-	30	70	100
CC	IT-114	Digital Electronics and Computer Organization	4	-	30	70	100
CC	IT-115	Lab Course on Problem Solving using Python	-	1.5	30	70	100
CC	IT-116	Lab Course on Fundamentals of Databases	-	1.5	30	70	100
CC	IT-117	Lab Course on Mathematical Techniques in IT	-	1.5	30	70	100
CC	IT-118	Lab Course on Digital Electronics and Computer Organization	-	1.5	30	70	100

Total Credits: 22

SEMESTER II

Course Type	Course Code	Paper Title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
CC	IT-121	Relational Database Management Systems	4	-	30	70	100
CC	IT-122	Web Designing using HTML and CSS	4	-	30	70	100
CC	IT-123	Computer Networks and Internet	4	-	30	70	100
CC	IT-124	Statistical Foundations	4	-	30	70	100
CC	IT-125	Lab Course on Relational Database Management System	-	1.5	15	35	50
CC	IT-126	Lab Course on Web Designing using HTML and CSS	-	1.5	15	35	50
CC	IT-127	Lab Course on Software Productivity Tools	-	1.5	15	35	50
CC	IT-128	Lab course on Statistical Foundations	-	1.5	15	35	50

Total Credits: 22

SECOND YEAR B.Sc. IT

SEMESTER III

Course Type	Course Code	Paper Title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
CC	IT-231	Data Structures	4	-	30	70	100
CC	IT-232	Exploratory Data analysis	4	-	30	70	100
CC	IT-233	Software Engineering	4	-	30	70	100
CC	IT-234	Lab Course on Data Structures	-	2	15	35	50
CC	IT-235	Lab Course on Exploratory Data Analysis	-	2	15	35	50
CC	IT-236	Lab Course on Content Management Systems	-	2	15	35	50
AECC-I	IT-237	Environment Science-I	2	-	15	35	50
AECC-II	IT-238	Soft Skills-I	2	-	15	35	50

Total Credits: 22

SEMESTER IV

Course Type	Course Code	Paper Title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
CC	IT-241	Object Oriented Programming	4	-	30	70	100
CC	IT-242	Web Technologies	4	-	30	70	100
CC	IT-243	Multimedia Technologies and Tools	4	-	30	70	100
CC	IT-244	Lab Course on Object Oriented Programming	-	2	15	35	50
CC	IT-245	Lab Course on Web Technologies	-	2	15	35	50
CC	IT-246	Lab Course on Multimedia Technologies and Tools	-	2	15	35	50
AECC-III	IT-247	Environment Science-II	2	-	15	35	50
AECC-IV	IT-248	Soft Skills-II	2	-	15	35	50

Total Credits: 22

THIRD YEAR B.Sc. IT

SEMESTER V

Course Type	Course Code	Paper Title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
DSE	IT-351	Advanced Java Programming	4	-	30	70	100
DSE	IT-352	Cryptography and Network security	4	-	30	70	100
DSE	IT-353	Computer graphics and Animation	4	-	30	70	100
DSE	IT-354	Lab Course on Advanced Java Programming	-	2	15	35	50
DSE	IT-355	Lab Course on Cryptography and Network security	-	2	15	35	50
DSE	IT-356	Lab Course on Computer Graphics and Animation	-	2	15	35	50
SECC-I	IT-357	Big Data Analytics	2	-	15	35	50
SECC-II	IT-358	Cloud Computing	2	-	15	35	50

Total Credits: 22

SEMESTER VI

Course Type	Course Code	Paper Title	Credits		Evaluation		
			T	P	CA	UA	TOTAL
DSE	IT-361	Mobile Application Development	4	-	30	70	100
DSE	IT-362	Software Testing	4	-	30	70	100
DSE	IT-363	Data Mining	4	-	30	70	100
DSE	IT-364	Lab Course on Mobile Application Development	-	2	15	35	50
DSE	IT-365	Lab Course on Software Testing	-	2	15	35	50
DSE	IT-366	Lab Course on Data Mining	-	2	15	35	50
SECC-III	IT-367	Block Chain Technology	2	-	15	35	50
SECC-IV	IT-368	Emerging Technologies	2	-	15	35	50

Total Credits: 22

*CC: Core Course
*DSE: Discipline Specific Elective
*AECC: Ability Enhancement Compulsory Course
*SECC: Skill Enhancement Compulsory Course

SEMESTER I

Savitribai Phule Pune University F.Y.B.Sc. (Information Technology) IT-111 Title: Problem Solving with Python		
Teaching Scheme 4 hours / week	No. of Credits 4	Examination Scheme CA: 30 marks UA: 70 marks

Prerequisites
1. Fundamental concepts of computers

Course Objectives: -
- To understand problem solving aspects.
- To learn problem solving using computers.
- To analyze a problem and devise an algorithm to solve it.
- To learn the basics of Python language.
- To acquaint with data types, input output statements, decision making, looping and functions in Python.
- To use Python data structures – lists, tuples, dictionaries to represent complex data.
- To read and write data using files with Python.

Course Outcomes: - Student will be able to: -
1. Inculcate and apply various skills in problem solving.
2. Choose most appropriate programming constructs and features to solve problems in diversified domains.
3. Demonstrate Python programming skills for problems that require the writing of well documented programs including use of the logical constructs of the language
4. Devise algorithms, implement, test, debug and execute programs in the Python language.

Course Contents		
Chapter 1	**Problem Solving using Computer**	**5 hours**

Problem Solving: General Problem-Solving Concepts, Problem solving using computers, Problem solving steps.
Program Design Tools: Algorithms, Flowcharts and Pseudo-codes, implementation of algorithms, algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum/maximum in a list, searching, etc.
Programming Languages: Language as a tool, types of languages, the compilation process

Chapter 2	**Basics of Python Programming**	**15 hours**

The Python Programming Language, History, versions, features, Applications, The Python programming environment, Basic Syntax, Writing and executing a Python program, Comments, Keywords and identifiers, Data types and Variables, Getting and setting the data type, Constants, Lines and indentation, Input/output with print and input, Command line arguments, Operators and expressions, Precedence of operators, type conversion

Strings: declaration, manipulation, special operations, escape character, string formatting operator, Built-in String functions.

Chapter 3	Control Statements and Functions	15 hours

Conditional Statements: if, if-else, nested if, if-elif-else statements
Looping- for, while, nested loops, the break, continue, pass, else statement used with loops.
Understanding and using Ranges
Functions – Need for functions, Function: definition, call, variable scope and lifetime, the return statement, passing arguments, arbitrary arguments, keyword arguments, default arguments, recursion, Lambda or anonymous function,

Chapter 4	Built-in structures	15 hours

List: Concept, creating and accessing elements, traversing a List, List operations: modifying, adding, deleting items, Built-in List functions, List comprehension and slicing
Tuple: Concept, Creating and Accessing a tuple, Basic tuples operations, unpacking a tuple, Concatenation, Repetition, in Operator, Iteration, Built-in tuple functions, indexing, slicing
Dictionary: Concept, Creating and Accessing dictionary elements, Updating Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys, Operations in Dictionary, Built-In Dictionary Functions, Built-in Dictionary Methods.
Set- Concept, set operations (Adding, Union, intersection), working with sets

Chapter 5	Files, Modules and Packages	10 hours

Files: Introduction, File path, Types of files, Opening and Closing files, Reading and Writing files.
Introduction to modules, standard library modules, Importing modules in python program, using the dir() Function
Working with Random Modules. E.g. - time, date time, calendar, sys, etc.
NumPy: Introduction to numpy, creating arrays, Array Input and Output, Indexing and slicing Arrays, Array Transposition, Array shape, reshape, split, search, sort, filter.
Introduction to packages in Python, creating and importing packages

Reference Books:

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705
2. R. G. Dromey, "How to Solve it by Computer", Pearson Education India; 1st edition, ISBN10: 8131705625, ISBN-13: 978-8131705629 Maureen Spankle, "Problem Solving and Programming Concepts", Pearson; 9th edition, ISBN-10: 9780132492645, ISBN-13: 978- 0132492645
3. Python Programming: A modular approach, Taneja Sheetal and Kumar Naveen, First edition, Pearson India, 2017, ISBN: 978-9332585348

E-Books and Online Learning Material
1. https://www.w3schools.com/python/
2. The Joy of Computing using Python - https://nptel.ac.in/courses/106/106/106106182/
3. Programming, Data Structures and Algorithms using Python - https://nptel.ac.in/courses/106/106/106106145/

Savitribai Phule Pune University F.Y.B.Sc. (Information Technology) IT-112 Title: Fundamentals of Databases		
Teaching Scheme 4hours / week	No. of Credits 4	Examination Scheme CA:30 marks UA: 70 marks

Prerequisites
Basics of mathematics

Course Objectives: -
- To understand the fundamental concepts of database management such as database design, database languages, and database-system implementation
- To study and understand systematic database design approaches
- To learn SQL – the database Query language

Course Outcomes: - Student will be able to: -
> On completion of the course, student will be able to–
1. Learn and practice data modeling using the entity-relationship model and developing database designs.
2. Understand the use of Structured Query Language (SQL) and learn SQL syntax.
3. Apply normalization techniques to normalize the database.
4. Learn types of file organization

Course Contents		
Chapter 1	**Introduction of DBMS**	**8 hours**

1.1 Data, Database and Concept of Database Management System (DBMS)
1.2 File system Vs DBMS
1.3 Structure of DBMS
1.4 Users of DBMS
1.5 Advantages of DBMS
1.6 Data models (relational, hierarchical, network)
1.7 Levels of abstraction
1.8 Data independence
1.9 Database Languages (DDL, DML, DCL, TCL)

Chapter 2	**Conceptual Design (E-R model)**	**8 hours**

2.1 Overview of DB design
2.2 E-R data model (entities, attributes, entity sets, relations, relationship sets),
2.3 Constraints (key constraints, participation constraints, weak entities, aggregation/ generalization)
2.4 Conceptual design for small to large enterprises,
2.5 Case studies

Chapter 3	**Structure of Relational Databases**	**12 hours**

3.1 Concepts of a table, a row, a relation, a tuple and a key in a relational

database

3.2 Conversion of ER to Relational model
3.3 Integrity constraints (primary key, referential integrity, Null constraint, unique constraint, check constraints

Chapter 4	SQL	14 hours

4.1 Introduction, DDL commands (create, drop, alter) with examples
4.2 Basic structure of SQL query
4.3 Set operations, Aggregate functions, Null values, Nested Sub-queries
 4.4 Modifications to Database (insert, delete, update),
4.5 SQL mechanisms for joining relations (inner joins, outer joins and their types)
4.6 Examples on SQL (case studies)

Chapter 5	DATABASE INTEGRITY AND NORMALISATION	12 hours

5.1 Pitfalls in Relational-Database Design (undesirable properties of a RDB design like repetition, inability to represent certain information)
5.2 Functional dependencies (Basic concepts, Closure of set of functional dependencies, Closure of an Attribute set)
5.3 Concept of a Super Key and a primary key (Algorithm to derive a Primary Key for a relation)
5.4 Concept of Decomposition, Desirable Properties of Decomposition (Lossless join and Dependency preservation)
5.5 Concept of Normalization - Normal forms (only definitions) 1NF, 2NF, 3NF, BCNF
5.6 Examples on Normalization

Chapter 6	File Organization	6 hours

6.1 Physical Database Design Issues
6.2 Storage of Database on Hard Disks
6.3 File Organisation and Its Types - Heap files (Unordered files)
6.4 Sequential File Organisation
6.5 Indexed (Indexed Sequential) file Organisation
6.6 Hashed File Organisation
6.7 Types of Indexes

Reference Books:

1. Henry F. Korth, Abraham Silberschatz, S. Sudarshan, "Database System Concepts", Tata McGraw-Hill Education
2. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems",   McGraw-Hill

E-Books and Online Learning Material
http://www.w3schools.com/html/html5_intro.asp

Savitribai Phule Pune University
F.Y.B.Sc. (Information Technology)
IT-113
Mathematical Techniques for IT

Teaching Scheme 4 Lectures / week	No. of Credits: 4	Examination Scheme CA: 30 marks ESE: 70 marks

Prerequisites:
1. *Sets, subsets, standard set operations: union, intersection, complement, symmetric difference, cartesian products, power sets; Algebraic laws etc.*
2. *Relations, binary relations; properties of relations: reflexivity, symmetry, anti-symmetry, transitivity; equivalence relation, equivalence classes and partitions, domain, codomain etc.*
3. *Orders, partial orders, and linear orders; chains; product and lexicographic order on cartesian products; upper and lower bounds, lub and glb etc.*

Course Objectives:
1. Introduce concepts of mathematical logic for analyzing propositions, proving theorems, solving a variety of problems and its applications.
2. Evaluate elementary mathematical arguments and identify fallacious reasoning.
3. Understand and apply mathematical foundations, computing and domain knowledge for the conceptualization of computing models from defined problems.
4. Model and analyze computational process using analytic and combinatorial methods.

Course Outcomes: Learner will be able to
1. Express mathematical properties via the formal language of propositional logic.
2. Acquire ability to describe computer programs in a formal mathematical manner.
3. Apply basic counting techniques to solve combinatorial problems;
4. Apply variety of methods for explaining, summarizing and presenting data and interpreting results clearly; and
5. Apply concepts of graphs and trees to tackle real situations such as connectivity and constraint satisfaction, e.g., scheduling.

Course Contents

Chapter 1	Matrices	08 Lectures

1.1 Elementary matrices, Matrix operations
1.2   Eigenvalues and Eigenvectors, Rank of matrix
1.3   Echelon form of matrix, System of linear equations
1.4   Gaussian Elimination Method, Gauss–Jordan Elimination Method

Chapter 2	Logic	08 Lectures

2.1 Propositional logic
2.2 Propositional Equivalences
2.3 Predicates and Quantifiers
2.4 Rules of inference

Chapter 3	Posets and Lattices	10 Lectures

3.1 Poset, Hasse diagram
3.2 Lattices, Complemented lattice, Bounded lattice and Distributive lattice,
3.3 Boolean functions, Boolean identities, Boolean algebra
3.4 Representation of Boolean functions, Logic gates

Chapter 4	Graphs and Trees	12 Lectures
4.1 Graph Terminology and Special Types of Graphs 4.2 Representing Graphs and Graph Isomorphism 4.3 Connectivity 4.4 Eulerian and Hamiltonian Paths 4.5 Shortest-Path Problems 4.6 Introduction to Trees, Applications of Trees, Tree Traversal		

Unit 5	Divisibility in Integers	12 Lectures
5.1 Well ordering principle, First and second principle of mathematical induction 5.2 Division Algorithm, Divisibility and its properties 5.3 Prime numbers, G.C.D. and L.C.M. 5.4 Euclidean Algorithm 5.5 Relatively prime integers 5.6 Euclid's lemma and its generalization 5.7 Congruence relation, Residue classes 5.8 Euler's and Fermat's Theorems		

Unit 6	Permutations and Combinations	10 Lectures
6.1 Cardinality of a Set 6.2 Basics of counting 6.3 Rules of sum and product 6.4 Permutations and combinations 6.5 Binomial coefficients and identities 6.6 Generalized permutations and combinations 6.7 Recurrence relations		

Reference Books:

1. Kenneth Rosen, Discrete Mathematics and It's Applications (Tata McGraw Hill).
2. C. L. Liu, Elements of Discrete Mathematics, (Tata McGraw Hill).
3. John Clark and Derek Holton, A First Look at Graph Theory (World Scientific).
4. Narsingh Deo, Graph Theory with Applications to Computer Science and Engineering, (Prentice Hall).
5. H. Anton and C. Rorres, Elementary Linear Algebra with Applications, Seventh Ed., Wiley, (1994).
6. B. Kolman, R. Busby, S. C. Ross, Nadeem-ur-Rehman, Discrete Mathematics Structure, Pearson Education, 5th Edition.
7. N. Biggs, Discrete Mathematics, 3rd edition, Oxford University Press.
8. A Foundation Course in Mathematics, Ajit Kumar, S. Kumeresan and Bhaba Kumar Sarma, Narosa Publication House.

Savitribai Phule Pune University		
F.Y.B.Sc. (Information Technology)		
IT-114		
Title: Digital Electronics and Computer Organization		
Teaching Scheme 4 hours / week	No. of Credits 4	Examination Scheme CA: 30 marks UA: 70 marks

Prerequisites
1. Basic Science concepts

Course Objectives: -
• To understand basic concepts of digital electronics
• To study basic computer organization

Course Outcomes: - Student will be able to: -
1. Solve problems on Number systems and their representation
2. Familiarize with logic gates and applications in combinational and sequential circuits
3. Comprehend the functional units of computer architecture
4. Knowledge of microprocessor and microcontroller

Course Contents		
Chapter 1	**Number Systems and Digital Codes**	**8 hours**
Features of Digital Systems, Number Systems: Decimal, Binary, Octal, Hexadecimal & their inter conversions, Representation of Data: Signed Magnitude, one's complement & two's complement, Binary Arithmetic, **Codes:** BCD, Excess -3, Gray code, alphanumeric codes (ASCII, EBCDIC, UNICODE), Error detecting and error correcting codes.		
Chapter 2	**Boolean Algebra**	**4 hours**
Basic gates (AND, OR, NOT gates), Universal gates (NAND and NOR gates), other gates (XOR, XNOR gates). Boolean identities, De Morgan Laws.		
Chapter 3	**Combinational Circuits**	**8 hours**
Half adder, full adder, half subtractor, full subtractor, n bit binary adder, Multiplexers and demultiplexers, encoders, decoders		
Chapter 4	**Sequential Circuits**	**8 hours**
Introduction to sequential circuits. Difference between combinational circuits and sequential circuits, Flip flops (RS, Clocked RS, D, JK, T), Shift registers and their types, Counters: Synchronous and Asynchronous counters.		
Chapter 5	**Computer organization**	**12 hours**
Block diagram of computer, Function of CPU, ALU, CU, system Buses, CPU organization, instruction cycle, stack organization, need of I/O interface, concepts of polling, interrupts, DMA		
Chapter 6	**Memory**	**4 hours**

Characteristics of memory, Memory hierarchy, Concept of ROM, RAM, PROM, EPROM, EEPROM, concept of address, data and control lines, concept of cache memory

Chapter 7	**Microprocessors and Microcontrollers**	**8 hours**

Introduction of Microprocessor, Features of Pentium based microprocessors (Data bus, Address bus, Speed, Addressable memory capacity, cache memory, Number of instructions executed parallelly), Introduction to microcontrollers, Difference between microprocessor and microcontroller, Von-Neumann & Harvard Architecture

Chapter 8	**Introduction to Embedded Systems**	**8 hours**

Embedded Systems and general-purpose computer systems, classifications, characteristics of embedded systems, applications of embedded systems, terms related to programming - machine language, assembly language and high-level language, assembler, compiler, disassembler, cross assembler, cross compiler, simulator

Reference Books:

4. Digital Electronics: R.P. Jain, Tata McGraw Hill
5. Digital Principles and Applications: Malvino Leach, Tata Mc Graw Hill
6. Digital Fundamentals: Floyd, Jain R.P., Pearson Education
7. Computer System Architecture: Morris Mano, Prentice Hall of India
8. Computer Organisation and Architecture: William Stallings, Prentice Hall of India
9. Introduction to Embedded Systems: K.V. Shibu, Tata McGraw Hill

E-Books and Online Learning Material

1. Digital Electronics: A.P. Godse, D.A. Godse, Technical Publications
2. Digital Electronics Principles, Devices and Applications: Anil K. Maini, Wiley
3. A practical introduction to computer architecture: Daniel Page, Springer
4. https://nptel.ac.in/courses/106/103/106103068/#
5. https://nptel.ac.in/courses/106/105/106105163/

Savitribai Phule Pune University F.Y.B.Sc. (Information Technology) IT-115 Title: Lab course on Problem Solving with Python		
Teaching Scheme 4 hours / week	No. of Credits 4	Examination Scheme CA: 30 marks UA: 70 marks

Prerequisites
1. **Problem solving with Python**

Course Objectives: -
- To apply problem solving aspects.
- To analyse a problem and devise an algorithm to solve it.
- To use the Python programming environment
- To execute Python programs

Course Outcomes: - Student will be able to: -
- CO1: Apply various skills in problem solving.
- CO2: Solve simple problems by choosing the most appropriate programming constructs and features in Python.
- CO4: Implement, test, debug and execute programs in the Python language.

Course Contents

Assignment 1: The Python programming environment

Using IDLE
Anaconda and Jupyter
Online tools such as Google Colaboratory

Assignment 2: Operators and Expressions

Simple programs using input-output, operators, keywords and variables
1   Program to Print Hello world!
2   Program to Add Two Numbers
3   Program to perform arithmetic operations on two numbers
4   Program to Calculate the Area of a circle and triangle
5   Program to Swap Two Variables
6   Program to demonstrate basic data types
7   Program to Generate a Random Number
8   Program to Convert Kilometers to Miles
9   Program to Convert Celsius To Fahrenheit
10   Program to convert height (in feet and inches) to centimeters.
11   Program to convert all units of time into seconds.
12   Program to convert seconds to day, hour, minutes and seconds.
13   Program to get the version you are using.
14   Program to display the current date and time.

Assignment 3: Decision Making
Programs to use if, if-else and nested if-else to demonstrate decision making in Python

Sample List:

1   Program to find maximum of two numbers
2   Program to check if a number is even or odd
3   Program to check if a number is positive, negative or 0
4   Program to find maximum of three numbers
5   Program to check if a year is leap
6   Program to check if a date is valid
7   Program to find the roots of a quadratic equation

Assignment 4: Loop constructs

Programs to demonstrate iteration using loop constructs in Python

Sample List:

1   Program to display first n numbers
2   Program to calculate factorial of a numbers
3   Program to display numbers in the reverse order
4   Program to check if a number is prime
5   Program to calculate sum and average of first n numbers
6   Program to display first n multiples of a number
7   Program to display first n Fibonacci numbers
8   Program to find the sum of digits of a number
9   Program to reverse a number
10   Program to display the first n prime numbers
11   Program to Print all Prime Numbers in an Interval
12   Program to find the maximum and minimum of n numbers
13   Program to find the LCM of two numbers
14   Program to find the GCD of two numbers
15   Program to find sum of series 1+2+3+...+n

Assignment 5: Functions and Recursion

Understand modular programming using functions and different ways of passing arguments to functions, Lambda functions

Sample List:

1   Function to check if a number is even or odd
2   Function to find the maximum of two numbers
3   Function with keyword arguments
4   Function with default arguments
5   Function to Find the Factorial of a Number Using Recursion
5   Function to Find the Sum of the Digits of the Number Recursively

6	Function to check if a Number is Prime or Not Prime Using Recursion
7	Function to Find the Product of two Numbers Using Recursion
8	Function to Find the Power of a Number Using Recursion

Assignment 6: Strings
Programs to demonstrate operations on strings in Python

Sample List:

1	Program to display ASCII Value of a Single Character
2	Program to Concatenate Strings
3	Program to Convert a string to uppercase
4	Program to count occurrences of a character in a string
5	Program to count vowels in a string
6	Program to count words in a sentence
7	Program to check is a string is a palindrome
8	Program to replace characters in a string
9	Program to toggle case of characters in a string
10	Program to find first and last occurrence of a character

Assignment 7: Lists and Tuples
Programs to demonstrate operations on lists and tuples in Python

Sample List:

1	Program to Create and view elements of a list
2	Program to Create and view elements of a tuple
3	Program to access List Index and Values
4	Program to add two Lists
5	Program to check if a List is Empty or Not
6	Program to Find the Largest Number in a List
7	Program to Find the Second Largest Number in a List
8	Program to Put Even and Odd elements in a List into Two Different Lists
9	Program to Merge Two Lists and Sort it
10	Program to Find the Union of two Lists
11	Program to Find the Intersection of Two Lists
12	Program to Create a List of Tuples with the First Element as the Number and Second Element as the Square of the Number
13	Program to Find all Numbers in a Range which are Perfect Squares and Sum of all Digits in the Number is Less than 10
14	Program to Generate Random Numbers from 1 to 20 and Append Them to the List
15	Program to Remove the Duplicate Items from a List

Assignment 8: Dictionary and Set
Programs to demonstrate operations on dictionary and sets in Python

Sample List:

1	Program to create and view a dictionary
2	Program to create and view elements of a set
3	Program to Print values of dictionary
4	Program to print all keys of dictionary
5	Program to insert and delete from dictionary
6	Program to sort (ascending and descending) a dictionary by value
7	Program to concatenate dictionaries to create a new one
8	Program to check whether a given key already exists in a dictionary.
9	Program to merge two Python dictionaries
10	Program to get the maximum and minimum value in a dictionary
11	Program to Add a list of elements to a set
12	Program to Update the first set with items that don't exist in the second set
13	Program to Return a set of elements present in Set A or B, but not both
14	Program to Check if two sets have any elements in common.
15	Program to Remove items from set1 that are not common to both set1 and set2

Assignment 9: File handling
Programs to demonstrate File handling in Python

Sample List:
1	Program to read the contents from a text file and display the same on screen.
2	Program to count the number of lines, words and characters from a text file.
3	Program to read lines from a text file and find the length of the longest line.
4	Program to read first n lines from a text file
5	Program to read last n lines of a file.
6	Program to count the frequency of words in a file.
7	Program to count lines starting with letter 'A'
8	Program to count lines starting with a word "The"
9	Program to count occurrences of a word in a file
10	Program to replaces all special characters by space

Assignment 9: Modules and packages
Programs to demonstrate use of NumPy arrays in Python

Sample List:
1	Program to Perform Arithmetic Operations on Array
2	Program to Copy an Array
3	Program to Count Even and Odd Numbers in an Array
4	Program to find Largest Number in an Array
5	Program to Count Positive and Negative Numbers in an Array
6	Program to find Length of a Numpy Array
7	Program to find Minimum and Maximum Value in an Array
8	Program to Print Even Numbers in an Array
9	Program to Print Odd Numbers in an Array
10	Program to Print Negative Numbers in an Array
11	Program to Print Numpy Array Items
12	Program to Print Positive Numbers in an Array

13	Program to Reverse the Numpy Array
14	Program to find Second Largest in an Array
15	Program to Print Smallest Number in an Array
16	Program to Sort Array in Ascending Order
17	Program to Sort Array in Descending Order
18	Program to find Sum of Numpy Array Items
19	Program to create a package and use it

Reference Books:

10. Laboratory manual prepared for this course

Savitribai Phule Pune University F.Y.B.Sc. (Information Technology) IT-116 Title: Lab Course on Fundamentals of Databases		
Teaching Scheme 3hours / week	No. of Credits 1.5	Examination Scheme CA:15 marks UA: 35 marks

Prerequisites
1. IT-112 Fundamentals of databases

Course Objectives: -
- To learn design of E-R diagrams
- To prepare and execute database queries

Course Outcomes: - Student will be able to: -
On completion of the course, student will be able to–
- Prepare E-R Diagram for the given problem statement
- Formulate appropriate SQL DDL and DML Queries

Assignments

1. Case study – ER diagram
2. Case study – ER diagram (with generalization)
3. Case study – ER diagram (with aggregation)
4. Using PostgreSQL (demo of PostgrSQL)
5. Data Definition queries (Create)
6. Data Definition querie (Alter)
7. Data Definition queries (Drop)
8. SQL DML Select queries
9. Queries using joins
10. Aggregate Functions and Group by and Having Clauses
11. Nested Queries (use of except, exists, not exists clauses)

Reference Books:

1. Henry F. Korth, Abraham Silberschatz, S. Sudarshan, "Database System Concepts", Tata McGraw-Hill Education
2 . Raghu Ramakrishnan and Johannes Gehrke, "Database ManagementSystems", McGraw-Hill

Savitribai Phule Pune University

F.Y.B.Sc. (Information Technology)

IT-117
Lab Course on Mathematical Techniques for IT
List of Practical's

Practical 1	Eigenvalue, Eigenvector, Rank of matrix, Echelon form of matrix
Practical 2	System of linear equations, Gaussian Elimination Method, Gauss–Jordan Elimination Method
Practical 3	Propositional logic, Equivalences, Predicates and Quantifiers, Rules of inference
Practical 4	Poset, Hasse diagram, Lattices, Complemented lattice, Bounded lattice and Distributive lattice
Practical 5	Boolean functions, Boolean identities, Boolean algebra, Representation of Boolean functions, Logic gates
Practical 6	Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphisms, Connectivity
Practical 7	Eulerian and Hamiltonian Paths, Shortest-Path Problems, Planar Graphs, Introduction to Trees, Applications of Trees, Tree Traversal
Practical 8	Well ordering principle, First and second principle of Mathematical Induction, Division Algorithm
Practical 9	Divisibility and its properties, Prime numbers, G.C.D. and L.C.M, Euclidean Algorithm
Practical 10	Relatively prime integers, Euclid are Lemma and its generalization, Congruence relation, Residue classes, Euler's and Fermat's Theorems
Practical 11	Cardinality of a Set, Basics of counting, Rule of sum and product, Permutations and combinations.
Practical 12	Binomial coefficients and identities, Generalized permutations and combinations, Recurrence relation.

Savitribai Phule Pune University

F.Y.B.Sc. (Information Technology)

IT-118
Lab Course on Digital Electronics and Computer Organization

Objectives:
1. To understand working of combinational and sequential circuits.
2. To develop skills of circuit connections.
3. To familiarize with laboratory instruments.

Learning outcomes:
1. Understand operation of logic gates.
2. Knowledge of basic digital circuits.
3. Ability of connecting digital circuits and verifying the outputs.
4. Ability of using instruments like voltmeter / multimeter.

The practical course consists of **10 experiments** out of which one will be activity equivalent to 2 practical sessions.

Activity can be any one of the following:
1. Hobby projects
2. Industrial visit / live work experience
3. Market Survey of Electronic Systems
4. Seminar of topic of latest trends in Electronic Science

Minimum 8 practical out of the following:

1. Study of Decimal to BCD/ (Binary) Converter.
2. Study of Logic Gates (Verification of Truth tables)
3. Implement basic gates using universal gates.
4. Verify De Morgan's theorems
5. Study of Half Adder and Full Adder using Logic Gates.
6. 4-bit binary parallel adder and subtractor
7. Study of Multiplexer and Demultiplexer (4:1 & 1:4).
8. Study of RS, JK and D flip flops using NAND gates
9. Study of 4-bit SISO Shift register
10. Study of asynchronous Up/Down Counter
11. Study of 8x4 matrix ROM
12. Study of Computer hardware system

SEMESTER II

Savitribai Phule Pune University F.Y.B.Sc. (Information Technology) IT-121 Title: Relational Database Management Systems		
Teaching Scheme 4hours / week	No. of Credits 4	Examination Scheme CA:30 marks UA: 70 marks

Prerequisites
Fundamentals of databases

Course Objectives: -
- To understand advanced SQL features and procedural SQL.
- To study concurrency control and crash recovery techniques.
- To understand need of database security.

Course Outcomes: - Student will be able to: -

On completion of the course, student will be able to–

- Formulate SQL queries using advanced SQL features.
- Perform Database operations using PL/PostgreSQL.
- Compare and contrast different concurrency control and recovery techniques.
- Apply mechanisms for database security.
- Know the other databases

Course Contents		
Chapter 1	**Relational Database Design**	**12 hours**
1.1 PL/Postgre SQL: Language structure 1.2 Controlling the program flow, conditional statements, loops 1.3 Views 1.4 Functions 1.5 Handling errors and exceptions 1.6 Cursors 1.7 Triggers		
Chapter 2	**Transaction Concepts**	**10 hours**
2.1 Transaction, properties of transaction, states of transactions 2.2 Concurrent execution of transactions and conflicting operations 2.3 Schedules, types of schedules 2.4 concept of serializability, precedence graph for serializability		
Chapter 3	**Concurrency Control**	**12 hours**
3.1 Ensuring serializability by locks, different lock modes 3.2 2PL and its variations 3.3 Multiple Granularity locking protocol 3.4 Basic timestamp method for concurrency, Thomas Write Rule 3.5 Locks with multiple granularity, dynamic database concurrency (Phantom Problem)		

	Timestamps versus locking	

Optimistic concurrency control algorithm, multi version concurrency control
Deadlock handling methods -
3.6 Detection and Recovery (Wait for graph).
3.7 Prevention algorithms (Wound-wait, Wait-die)
          Deadlock recovery techniques (Selection of Victim, Starvation, Rollback)

Chapter 4	Crash recovery	**12 hours**

4.1 Transaction Failure classification

4.2 Recovery concepts

4.3 Checkpoints

4.4 Recovery with concurrent transactions (Rollback, checkpoints, commit)

4.5 Log base recovery techniques (Deferred and Immediate update)

4.6 Buffer Management

4.7 Database backup and recovery from catastrophic failures

4.8 Shadow paging

Chapter 5	**Database Security**	**8 hours**

5.1 Introduction to database security concepts

5.2 Methods for database security
     - Discretionary access control method
     - Mandatory access control and role-based access control for multilevel security

5.3 Use of views in security enforcement

5.4 Overview of encryption technique for security

5.5 Statistical database security

Chapter 6	**Introduction to other databases**	**6 hours**

6.1 Centralized and Client – Server Architectures

6.2 Server System Architecture

6.3 Introduction to Parallel and distributed databases

6.4 Introduction to Object Based Databases

6.5 NoSQL databases

6.6 Big data bases

Reference Books:

1. Henry F. Korth, Abraham Silberschatz, S. Sudarshan, "Database System Concepts", Tata McGraw-Hill Education
2 . Raghu Ramakrishnan and Johannes Gehrke, "Database ManagementSystems", McGraw-Hill
 3. Fundamentals of Database Systems- Ramez Elmasri, Shamkant B. Navathe, 6th
 edition– Pearson.
4. Introduction to Database Management System- Bipin Desai, 3rd edition, Galgotia Publication
5. An Introduction to Database Systems - C.J. Date, 7th edition, Addison-Wesley
6. Practical PostgreSQL- Joshua D. Drake, John C Worsley, O'Reilly Publications

E-Books and Online Learning Material
http://www.postgresql.org/docs/9.3/static/tutorial.html
http://www.w3schools.com/html/html5_intro.asp

Savitribai Phule Pune University **F.Y.B.Sc. (Information Technology)** **IT-122** **Title: Web Designing using HTML and CSS**		
Teaching Scheme 4 hours / week	**No. of Credits**: 4	**Examination Scheme** CA :30 marks UA: 70 marks

Course Objectives: -
1. To explain different components and technologies of World Wide Web as a platform.
2. To develop the static website using client-side programming like HTML and CSS.
3. To enable students to understand web page site planning, management and maintenance.
4. To explain the concepts of developing advanced HTML pages with the help of frames, scripting language.

Learning Outcomes: -
1. Understand the fundamentals of Internet and how the web function.
2. Design a static webpage by applying HTML elements.
3. Apply CSS concepts for designing HTML web pages.
4. To acquire knowledge and skills for creation of web site considering client-side programming.
5. Understand need and purpose of Web Hosting

Course Contents		
Chapter 1	**Basic Terminology of Web and Web Design Principles** 1.1 What is Internet 1.2 Brief History of Internet 1.3 What is World Wide Web 1.4 Client Server Architecture 1.5 Web Server Vs Web browser 1.6 Webpages 1.7 Website 1.8 How website works? 1.9 Types of Websites 1.10 Domain Name Server and Uniform Resource locator 1.11 Basic principles involved in developing a web site 1.12 Five Golden rules of web designing 1.13 Web Standards and W3C recommendations	**10 hours**
Chapter 2	**Introduction to HTML5** 2.1 What is HTML 2.2 Features of HTML 2.3 What is difference between HTML and HTML5 2.4 Basic structure of an HTML document	**25 hours**

	2.5 Basic Building blocks of HTML 2.6 Block level Tags and Inline Tags 2.7 Core Attributes of HTML- id, style, class, title 2.8 Working with Lists, Tables and Frames 2.9 Working with Text and Image Hyperlinks, Images and Multimedia 2.10 Working with Forms and Controls 2.11 Advanced Tags in HTML5	
Chapter 3	**Introduction to Cascading Style Sheets** 3.1 Concept of CSS 3.2 Need of CSS 3.3 Creating Style Sheet -Inline, External, Embedded CSS. 3.4 CSS Selectors 3.5 Types of Selectors 3.6 CSS Properties -Position, Float, clear, visibility 3.7 CSS3 Flexbox Layout 3.8 CSS3 Grid Layout 3.8 CSS Styling Properties (Background, Text Format, Controlling Fonts) 3.9 Working with Lists and Tables 3.10 Box Model (Border properties, Padding Properties, Margin properties, Display properties) 3.11 CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Navigation Bar, Image) 3.12 CSS3 Advanced properties: Z-index, Opacity Property, Transition effect, Transform effect, Animation effect.	**20 hours**
Chapter 4	**Introduction to Web Publishing or Hosting** 4.1 What is Web Hosting? 4.2 Need of Web Hosting 4.3 Types of Hosting packages 4.4 Registering Domains 4.5 Defining Name Servers 4.6 Steps to host the website	**5 hours**
Learning Resources:		
Text Books	HTML5 and CSS3- WAN BAYROSS -BPB Publications	
Reference Books	1. HTML and CSS, 5th Edition –Thomas A Powell 2. Head First HTML and CSS,2nd Edition-Elisabeth Robson and Eric Freeman –O'Reilly 3. An introduction to Web Design + Programming- Paul S Wang, Sanda S Katila	
Web References	1. http://www.w3schools.com 2. https://html5andcss3.org/	

Savitribai Phule Pune University
F.Y.B.Sc. (Information Technology)
IT-123
Title: Computer Networks and Internet

Teaching Scheme 4 hours / week	No. of Credits: 4	Examination Scheme CA :30 marks UA: 70 marks

Course Objectives: -
- To understand basic terms of computer networks and the internet environment.
- Understand computer networks and browse the Internet, content search, email and collaborate with peers.

Learning Outcomes: -
1. Understanding Social Networking platform.
2. Gather knowledge of various types of networks and topologies.
3. Get an overview of the Internet, its applications and various browsers available to access the Internet.
4. Connect to the Internet using various modes of connections/devices available.
5. Get knowledge of device identification on local network as well as on the Internet for both Desktop and Mobile Devices.

	Course Contents	

Chapter 1	**Networking Fundamentals**
	1.1 Evolution of Internet
	1.2 Understanding Network Basics (N/W Components, N/W Device Roles)
	1.3 Understanding Data Communications (low- and high-level protocols)
	1.4 Types of Computer Networks (LAN, CAN, MAN, WAN)
	1.5 Network Architectures (Centralized, Decentralized and Distributed)
	1.6 Internet Technologies (Intranets and Extranets)
	1.7 Pervasive Networking
	1.8 Internet Applications: FTP, TELNET, Email, chat
	1.9 Network Security Concepts: Cyber Law, Firewall, Cookies, Hackers and
	     Crackers
	1.10 Types of Payment System (Digital Cash, Electronic Cheque, Smart Card,
	      Debit/Credit Card)
		10 hours

Chapter 2	**Network Topologies**
	2.1 Comparing Physical Network Topologies
	    2.1.1 Bus, Ring, Star and Mesh Topologies
	2.2 Comparing Wireless Network Topologies
	    2.2.1 Adhoc Mode, Infrastucture Mode and Wireless Mode
	2.3 Undestanding other Topology Issues
		10 hours

Chapter 3	**Networking Models** 3.1 Layering Models 3.2 How data passes through the layers? 3.3 OSI Model 3.4 TCP/IP Model 3.5 Internet Model	**10 hours**

Chapter 4	**Network Protocols**	**20 hours**
	3.1 Application Layer Protocols (Private Communication and Standardized Service)	
	3.2 Web Protocols (HTML, URL, HTTP)	
	3.3 Document representation with HTML	
	3.4 Uniform Rescource Locators and Hyperlinks	
	3.5 Web document transfer with HTTP(GET, HEAD, POST, PUT)	
	3.6 File Transfer Prototol (FTP)	
	3.7 FTP Communication Paradigm -Electronic mail (Transfer, Access, Representation)	
	3.8 Simple Mail Transfer Protocol (SMTP)	
	3.9 ISPs,Mail Servers and Mail Access	
	3.10 Mail Access Protocols (POP3, IMAP)	
	3.11 Email Representation Standards (RFC2822, MIME)	
	3.12 Domain Name Server (DNS Hierarchy and Server Model)	
Chapter 5	**Network Technologies**	**10 hours**
	5.1 Circuit Switching	
	5.2 Packet Switching	
	5.3 Local and Wide Area Packet Networks	
	5.4 Standards for Packet Format and Identification	
	5.5 Point to Point and Multi Access Networks	
	5.6 LAN Topologies	
	5.7 Packer Identification, Demultiplexing and MAC address	
	5.8 Unicast, Broadcast and Multicast Addresses	
	5.9 Frames and Framing	
	5.10 Byte and Bit Stuffing	
Learning Resources:		
Text Books	TCP/IP Protocol Suite, Behrouz A. Forouzan, 4th Edition, Tata McGrawHill	
Reference Books	1. Computer Networks and Internets, 5th Edition, Douglas E. Comer, Pearson 2. Networking Basics, 2nd Edition, Patrick Ciccarelli, Christina Faulkner, Jerry Fitzgerald, Alan Dennis, David Groth and Toby Skandier with Frank Miller, Wiley 3. Internetworking with TCP/IP, Volume I, 5th Edition, Douglas E. Comer, PHI. 4. Internetworking with TCP/IP, Volume II, 3rd Edition, Douglas E. Comer, D.L. Stevens, PHI 5. TCP/IP Illustrated, Eastern Economy Edition,N.P. Gopalan, B.Siva Selvan, PHI 6. Computer Networking by Ed Tittel, McGRaw Hills Companies	

Savitribai Phule Pune University
Savitribai Phule Pune University
F.Y.B.Sc. (Information Technology)
IT-124
Title: Statistical Foundations

Teaching Scheme 4 hours / week	No. of Credits 4	Examination Scheme CA: 30 marks UA: 70 marks

Prerequisites
  1. **IT-113 – Foundations of Mathematics**

Course Objectives: -
- Introducing students to the basic concepts of statistics
- Introducing students to the basic concepts of probability

Course Outcomes: - Student will be able to: -
  5. Describe given data via summary statistics
  6. Visualize given data via basic graphs
  7. Compute probabilities of various events using basic laws of probability
  8. Explore relationships between two variables using linear regression

Course Contents

Chapter 1	**Introduction to Statistics**	**15 hours**

Identifying variables in a study, quantitative and qualitative variables, levels of measurement, viz. nominal, ordinal, interval, ratio, Population and Sample, Importance of random sample, Types of samples, viz., simple random sample, stratified sample, systematic sample, cluster sample, multistage sample, convenience sample, snowball sample, comparison between descriptive and inferential statistics, Introduction to experimental designs, control groups, placebo effects, randomized design, surveys, potential pitfalls such as nonresponse, hidden bias, voluntary response, confounded variables

Chapter 2	**Descriptive Statistics**	**10 hours**

Frequency Distribution and Relative Frequencies, Cumulative Frequency, Mean, Trimmed Mean, Mode, Median, Geometric Mean, Harmonic Mean, Pooled arithmetic mean, Quartiles, Deciles, Percentiles, Range, Quartile Deviation, Mean Absolute Deviation, Standard Deviation, Variance, Pooled standard deviation, Coefficient of Variation, Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution. Coefficient of skewness, Concepts of Kurtosis, Leptokurtic, Mesokurtic and Platykurtic frequency distribution.

Chapter 3	**Visualizing Data**	**5 hours**

Bar Plots, Clustered Bar Plots, Pie Charts, Histograms, Ogive Curves, Stem and Leaf displays, Boxplots, Time Series Graphs

Chapter 4	**Elementary Probability**	**10 hours**

Concepts of Sample Space, Events, Complements, Unions, Intersections, Mutually exclusive events, Independent events, Dependent events, Mutually exhaustive events Elementary

probability, Conditional probability, Multiplication law for probability of intersection, Addition law for probability of union, Bayes' theorem

Chapter 5	Probability Distributions	10 hours

Discrete and Continuous Distributions, Probability Mass Function, Probability Density Function, Cumulative Distribution Function, Bernoulli Distribution, Binomial Distribution, Poisson Distribution, Normal Distribution

Chapter 6	Bivariate Data	10 hours

Scatter Plot, Sample Covariance, Sample Correlation, Simple Linear Regression, Two way contingency tables, Marginal and Conditional frequency distributions, Simpson's paradox

Reference Books:

1. Brase C. H. and Brase C. P., (2018), Understandable Statistics, Twelfth Edition, Cengage Learning, Biston
2. Freedman D., Pisani R., Purves R. (2007), Statistics, Fourth Edition, W. W. Nortan and Company, New York
3. Gupta S. C. (2018), Fundamentals of Statistics, Himalaya Publishing House
4. Moore D. S., Notz W. I., Flinger M. A., (2013), The Basic Practice of Statistics, Sixth Edition, Freeman and Company New York

E-Books and Online Learning Material
1. https://online.stat.psu.edu/stat100/
2. https://online.stat.psu.edu/stat200/
3. https://online.stat.psu.edu/stat414/
4. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=JVkwqv+HM+natE9SiF7CZA==
   (Paper P02: Applied Business Statistics)

Savitribai Phule Pune University F.Y.B.Sc. (Information Technology) IT-125 Title: Lab Course on Relational Databases		
Teaching Scheme 3hours / week	No. of Credits 1.5	Examination Scheme CA:15 marks UA: 35 marks

Prerequisites
IT-112 Fundamentals of databases

Course Objectives: -
- To learn advanced features in SQL such as Nested queries and Views
  - To become familiar with PL/Postgre SQL

Course Outcomes: - Student will be able to: -
   On completion of the course, student will be able to–
- Formulate SQL queries using advanced features
- Write stored procedures, cursors and triggers using PL/Postgre SQL.
- Design a database using database normalization technique

<div align="center">Assignments</div>

1. Simple and Nested Queries
2. Views Creation
3. Stored Functions
4. Cursors
   - Simple Cursor
   - Parameterize Cursor
5. Designing a Database using normalization theory for the given application / database design
6. Error and Exception handling
   - Raise Notice
   - Raise Exception
7. Triggers
   - Before (Insert, Update, Delete)
   - After   (Insert, Update, Delete)

Reference Books:

1. Henry F. Korth, Abraham Silberschatz, S. Sudarshan, "Database System Concepts", Tata McGraw-Hill Education
2. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", McGraw-Hill

E-Books and Online Learning Material
1. https://www.tutorialspoint.com/plsql/plsql_triggers.htm

Savitribai Phule Pune University

F.Y.B.Sc. (Information Technology)

IT-126

Lab Course on Web Designing using HTML and CSS

Sr. No.	Practical List
1.	Write a program using HTML to implement block level Tags- <p>, Heading Tags,<pre> tag,<div>tag,<hr>tag.
2.	Write a program using HTML to implement Inline level Tags-<i>,<u>,<b>,<sub>,<sup>,<small>,<tt>,<bdo>,<abbr>,<big>,<span>.
3.	Write a program using HTML to implement to create text hyperlink and Image hyperlink.
4.	Write a program using HTML to implement to create text hyperlink and Image hyperlink.
5.	Write a program using HTML to create ordered list of items.
6.	Write a program using HTML to create unordered list of items.
7.	Write a program using HTML to create description list of items.
8.	Write a program using HTML to create nested list of items.
9.	Write a program using HTML to create a simple Table
10.	Write a program using HTML to create a complex table using rowspan and colspan attributes of table tag.
11.	Write a program using HTML to create a Login Form using form tag and control tags.
12.	Write a program using HTML to create a Registration Form using form tag and control tags.
13.	Write a program using HTML to implement advanced tags of HTML5.
14.	Write a program using HTML and CSS to implement CSS Properties like – CSS Colors, CSS Border.
15.	Write a program using HTML and CSS to implement CSS Properties like -CSS Fonts, CSS Texts.
16.	Write a program using HTML and CSS to implement CSS Properties like - CSS Padding and CSS Margin
17.	Write a program using HTML and CSS to implement CSS Properties like - CSS Display and CSS Position
18.	Write a program using HTML and CSS to implement CSS Flexbox Layout Property
19.	Write a program using HTML and CSS to implement CSS Grid Layout Property
20.	Write a program using HTML and CSS to implement- CSS Transition Properties

21.	Write a program using HTML and CSS to implement- CSS Transform Properties
22.	Write a program using HTML and CSS to implement- CSS Animation Properties
23.	Write a program using HTML and CSS to implement- CSS Opacity and z-index property

Savitribai Phule Pune University
F.Y.B.Sc. (Information Technology)
IT-127
Title: Lab Course on Software Productivity Tools

Teaching Scheme 4 hours / week	No. of Credits 4	Examination Scheme CA: 30 marks UA: 70 marks

Prerequisites
1. **Fundamental concepts of computers**
2. **Accessing and using the internet**

Course Objectives: -
- Familiarize with using an operating system.
- To understand the concept and use of word processing.
- To understand the concept and use of spreadsheet.
- To learn how to make effective presentations.
- To be aware of the latest tools and their application to organizations.

Course Outcomes: - Student will be able to: -
- CO1: Apply various skills in preparing and editing effective documents, spreadsheets and presentations.
- CO2: Choose the most appropriate tool for a specific task.
- CO3: Improve their efficiency in daily computer-related activities.

Course Contents

Assignment 1: Using the operating System (Windows / Linux)

Starting the Machine, shutdown, login and logoff
Desktop GUI Components: Cursors/Pointers, Icons, GUI Menus, icons and their functions
Start menu, Task Bar - System Tray - Quick launch tool bar - Start button, Help Menu
Computer Hardware and System configuration
File System: Files and Folders, Navigating the file system, Opening & Saving files, Creating, renaming, deleting, moving folders
Printing.
Parts of Windows -Title bar-Menu bar - Scroll bar- Status bar, Maximize, Minimize, close and Resize & Moving a Window
Key board short keys

Assignment 2: Document editing software

Opening & Saving files, Editing text documents, Inserting, Deleting, Cut, Copy, Paste, Undo, Redo, Find, Search, Replace, Formatting page & setting Margins, Converting files to different formats, Importing & Exporting documents, Sending files to others, Using Tool bars, Ruler, Using Icons, using help

Formatting Documents - Setting Font styles, Font selection- style, size, color etc, Type face - Bold, Italic, Underline, Case settings, Highlighting, Special symbols, Setting Paragraph style, Alignments, Indents, Line Space, Margins, Bullets & Numbering.
Setting Page style - Formatting Page, Page tab, Margins, Layout settings, Border & Shading, Columns, Header & footer, Page numbers, Inserting page break, Column break and line break, Creating sections & frames, Anchoring & Wrapping, Setting Document styles, Table of Contents, Index, Page Numbering, date & Time, Author etc., Creating Master Documents, Web page.
Creating Tables- Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, and Formula, Drawing - Inserting ClipArts, Pictures/Files etc.,
Tools – Word Completion, Spell Checks, Mail merge, Templates, Creating contents for books, Creating Letter/Faxes, Creating Web pages, Using Wizards, Tracking Changes, Security, Digital Signature. Printing Documents – Shortcut keys.
Free Open Source Software: Introduction to Open Office Suite - Selecting the application package, Working with Documents- Formatting Documents - Setting Page style- Creating Tables - Drawing- Tools - Printing Documents
Online tools: Google docs

Sample Assignment

Create a document with the following contents:

1.   List the names of your 10 classmates –Give Bullets, Numbers,   Sort the names alphabetically
2.   Create a 3*10 table with the following data:
Rollno   Name   Address

a)   Insert a row at the top
b)   Type the following in the first cell of the table:
c)   Student Details Year 20XX -20XX. Merge the cells of the first row.
d)   The heading should be in bold.
e)   Apply borders to the table.
f)   Centre the data in each column.
g)   Add Shading effects to the table. (use different table formats)
        Perform the following operations:
            o   Insert, delete rows & columns
            o   Table AutoFormats
            o   Split & Merge Cells
            o   Split table
            o   Use Formula

3.   Create a document with a brief paragraph about yourself.
a)   Change the spacing between lines to double.
b)   Indent the text by 1 inch from left margin.
c)   Number each line in the text (using bullets and numbering). The distance between the text and number should be set to 0.5.
d)   Mark the entire text and view it with different alignment setting: centered, right-aligned, left aligned and finally make it cantered.

e)   Copy & paste the above three lines so as to fit in 2nd page and save the document.

f)   Number the pages as 1,2 in the document. The page number should appear in the footer area, should be right- aligment.

4.   Create your bio data in MS – Word.

5.   Create your time – table in MS – Word. Use options – Insert, Delete row, split and merge cells.

Assignment 3: Spreadsheets and its applications

Opening Spreadsheet, Menus - main menu, Formula Editing, Formatting, Toolbars, Spreadsheet types.
Importing and exporting spreadsheets
Spread sheet addressing - Rows, Columns & Cells, Referring Cells & Selecting Cells – Shortcut Keys.
Entering & Deleting Data- Entering data, Cut, Copy, Paste, Undo, Redo, Filling Continuous rows, columns, highlighting values, Find, Search & replace, Inserting Data, Insert Cells, Column, rows & sheets, Symbols, Data from external files, Frames, Clipart, Pictures, Files etc,
Inserting Functions, Manual breaks, Setting Formula - finding total in a column or row Mathematical operations (Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formulae.
Formatting Spreadsheets- Labelling columns & rows, Formatting- Cell, row, column & Sheet, Category - Alignment, Font, Border & Shading, Hiding/ Locking Cells, Worksheet Row & Column Headers, Sheet Name, Row height & Column width, Visibility - Row, Column, Sheet, Security, Sheet Formatting & style, Sheet background, Color etc, Borders & Shading – Shortcut keys.
Working with sheets – Sorting, Filtering, Validation, Consolidation, and Subtotal.
Creating Charts - Drawing. Printing.
OpenOffice-Calc - Introduction – Introduction to Spreadsheets, Overview of a Worksheet, Creating Worksheet & Workbooks, Organizing files, Managing files & workbooks, Functions & Formulas, Working with Multiple sheets, Creating Charts & Printing Charts
Online tools: Google sheets

Assignment 4: Creating presentations
Introduction, Opening new Presentation, Different presentation templates, Setting backgrounds,
Selecting presentation layouts.
Creating a presentation
Setting presentation style, Adding Text to the presentation
Formatting a presentation - Adding style, Color, gradient fills, Arranging objects, Adding Header & Footer, Slide background, Slide layout
Adding Graphics to the presentation - Inserting pictures, movies, tables, etc into the presentation; Drawing Pictures using Draw

Adding effects to the presentation - Setting Animation & transition effect, Adding audio and video,
Printing Handouts and Generating standalone presentation viewer

Reference Books:

11. Laboratory manual

E-Books and Online Learning Material

4. https://support.microsoft.com/en-us/training
5. https://edu.gcfglobal.org/en/subjects/office/
6. Open Office:
   https://www.openoffice.org/documentation/manuals/OOo1.x.x/user_guide.pdf
7. Google   docs   training:
   https://support.google.com/a/users/answer/9282664?hl=en
8. https://edu.gcfglobal.org/en/googledocuments/

Savitribai Phule Pune University
Savitribai Phule Pune University **F.Y.B.Sc. (Information Technology)** **IT-128** **Title: Lab Course on Statistical Foundations**

Teaching Scheme 1.5 hours / week	No. of Credits 1.5	Examination Scheme CA: 15 marks UA: 35 marks

Prerequisites
  1. **IT-113 – Foundations of Mathematics**

Course Objectives: -
- Enabling students to use R for exploratory statistical analysis

Course Outcomes: - Student will be able to: -
1. Compute summary statistics using R
2. Draw simple graphs using R
3. Compute probabilities and distribution functions for simple distributions using R
4. Fit a simple linear regression model using R

Course Contents

Chapter 1	**Exploratory Statistics**	**8 hours**

1. Import external data in R
2. Compute summary statistics using R
3. Draw bar chart using R
4. Draw pie chart using R
5. Draw histogram using R
6. Draw boxplot using R
7. Draw time series graph using R
8. Prepare a frequency table in R

Chapter 2	**Probability Distributions**	**8 hours**

9. Compute probability mass function and cumulative distribution function for binomial distribution using R
10. Compute probability mass function and cumulative distribution function for Poisson distribution using R
11. Compute probability mass function and cumulative distribution function for normal` distribution using R
12. Generate random samples from the above distributions in R

Chapter 3	**Modelling Bivariate Data**	**8 hours**

13. Compute sample covariance and sample correlation using R
14. Draw a scatter plot using R
15. Fit a simple linear regression model using R

16. Examine the goodness of fit of the fitted simple linear regression model using R

Reference Books:

1. Purohit S. G. Gore S. D., Deshmukh, S. R. (2008), Statistics Using R, Alpha Science publishers
2. Loftus S. C. (2021), Basic Statistics with R, Elsevier
3. Dalgaard P. (2008), Introductory Statistics with R, Springer

E-Books and Online Learning Material

1. https://open.umn.edu/opentextbooks/textbooks/559
2. https://cran.r-project.org/doc/contrib/Rossiter-RIntro-ITC.pdf
3. https://cran.r-project.org/doc/contrib/Paradis-rdebuts_en.pdf