SRI A.S.N.M GOVERNEMENT COLLEGE (A), PALAKOL

B.Sc (Computer Science)
(For M.P.Cs, M.C.Cs)
Syllabus and Model Papers

Employability

Entrepreneurship

Skill Development

SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT
(Affiliated to Adikavi Nannaya University, Rajahmundry)
(Accredited with NAAC "B" Grade with 2.61 CGPA points)
(W.e.f. 2020-21 Admitted Batch)

I B.Sc I Semester Syllabus
Paper I: Problem Solving in C   60hrs (4hrs/week)

Time: 3 Hours   **Max.Marks:60**

Course Objective:

The aim of this course is to provide exposure to problem-solving through programming. It introduces the concepts of the C Programming language.

Course Outcomes:

On Completion of the course, the students will be able to:

CO-1. Understand the evolution and functionality of a Digital Computer
CO-2. Apply logical skills to analyze a given problem
CO-3. Develop an algorithm for solving a given problem.
CO-4. Understand 'C' language constructs like Iterative statements, Array processing, Pointers.
CO-5. Apply 'C' language constructs to the algorithms to write a 'C' language program.

UNIT I
General Fundamentals: Introduction to computers: Block diagram of a computer, characteristics and limitations of computers, applications of computers, types of computers, computer generations.
Introduction to Algorithms and Programming Languages: Algorithm – Key features of Algorithms, Flow Charts, and Programming Languages – Generations of Programming Languages
                                                                                                (12 hrs.)

UNIT II
Introduction to C: Introduction – Structure of C Program – Writing the first C Program – File used in C Program – Compiling and Executing C Programs – Using Comments –Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Statements in C- Operators in C- Programming Examples.
Decision Control and Looping Statements: Introduction to Decision Control Statements– Conditional Branching Statements – Iterative Statements – Nested Loops – break and continue Statement.   **(12 hrs.)**

UNIT III
Arrays: Introduction – Declaration of Arrays – Accessing elements of the Array – Storing Values in Array– Operations on Arrays – one dimensional, two dimensional and multi-dimensional arrays, character handling and strings.   **(10 hrs.)**

UNIT IV
Functions: Introduction – using functions – Function declaration/ prototype – Function definition – function call – return statement – Passing parameters – Scope of variables – Storage Classes – Recursive functions.
Structure, Union, and Enumerated Data Types: Introduction – Nested Structures – Arrays of Structures – Structures and Functions– Union – Arrays of Unions Variables. Enumerated Data Types.

UNIT V

Pointers: Understanding Computer Memory – Introduction to Pointers – declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers - Passing Arguments to Functions using Pointer – Pointer and Arrays – Memory Allocation in C Programs – Memory Usage – Dynamic Memory Allocation – Drawbacks of Pointers

Files: Introduction to Files – Using Files in C – Reading Data from Files – Writing Data to Files – Detecting the End-of-file – Error Handling during File Operations – Accepting Command Line Arguments.   **(14 hrs.)**

TEXT BOOKS:

1. E Balagurusamy – Programming in ANSIC – Tata McGraw-Hill publications.
2. Brain W Kernighan and Dennis M Ritchie - The 'C' Programming language" - Pearson publications.
3. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publications.
4. YashavantKanetkar - Let Us 'C' – BPB Publications.

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I B.Sc I Semester
Problem Solving in C Lab

Time: 2 Hours   **Max.Marks:50**

Objecives:

1. The purpose of this course is to introduce to students to the field of programming in C language.

2. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C

List of Programs:

1. Write a program to check whether the given number is Armstrong or not.
2. Write a program to find the sum of individual digits of a positive integer.
3. Write a program to generate the first n terms of the Fibonacci sequence.
4. Write a program to find both the largest and smallest number in a list of integer values
5. Write a program to demonstrate refection of parameters in swapping of two integer values using **Call by Value Call by Address**
6. Write a program that uses functions to add two matrices.
7. Write a program to calculate factorial of given integer value using recursive functions
8. Write a program for multiplication of two N X N matrices.
9. Write a program to perform various string operations.
10. Write a program to search an element in a given list of values.
11. Write a program to sort a given list of integers in ascending order.
12. Write a program to calculate the salaries of all employees using *Employee (ID, Name, Designation, Basic Pay, DA, HRA, Gross Salary, Deduction, and Net Salary)* structure.
    a. DA is 30 % of Basic Pay
    b. HRA is 15% of Basic Pay
    c. Deduction is 10% of (Basic Pay + DA)
    d. Gross Salary = Basic Pay + DA+ HRA
    e. Net Salary = Gross Salary - Deduction
13. Write a program to illustrate pointer arithmetic.
14. Write a program to read the data character by character from a file.
15. Write a program to create *Book (ISBN, Title, Author, Price, Pages, Publisher)* structure and store book details in a file and perform the following operations
    a. Add book details
    b. Search a book details for a given ISBN and display book details, if available
    c. Update a book details using ISBN
    d. Delete book details for a given ISBN and display list of remaining Books

Lab Evaluation Procedure

1. **Record:**   **10 Marks**

2. **Procedure cum Execution:**   **30 Marks**

3. **Viva:**   **10 Marks**

                Total   **50 Marks**

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I B.Sc I Semester Model Paper

Paper I: PROBLEM SOLVING IN C

Time: 3 Hours   **Max.Marks:60**

Section-A

I.   Answer any FIVE questions   **(5x4=20)**
   1. Explain Block diagram of a computer.
   2. Define an Algorithm. What are the key features of an algorithm?
   3. What is an Array? Explain.
   4. Define functions. Explain its usage.
   5. What is a Pointer? Explain.
   6. Dynamic memory allocation.
   7. Explain Nested Loops.
   8. Briefly explain various types of recursions.

Section-B

II.   Answer any FIVE questions   **(5x8=40)**
9. (a) Briefly explain about generations of computers.
                              (OR)
   (b) What is Flow Chart? Explain with an example.

10. (a) What are the different types of Decision Control Statements? Explain in detail.
                              (OR)
   b) Explain about iterative statements available in C.

11. a) What is an Array? Explain different types of arrays with examples.

                              (OR)

   b) What is a string? Explain various string handling functions available in C.

12. a) Define a function. Explain the passing parameter mechanism.

                              (OR)

   b) Explain about Structure with syntax and example in detail

13. a) Write a C program for Passing Arguments to Functions using Pointer.
                              (OR)
   (b)Write a C program for Reading Data from Files and Writing Data to Files.

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I B.Sc II Semester Syllabus
Paper II:DATA STRUCTURES USING C   60hrs (4hrs/week)

Time: 3 Hours   **Max.Marks:60**

Course Objective:

To introduce the fundamental concept of data structures and to emphasize the importance of various data structures in developing and implementing efficient algorithms

Course Outcomes:

On Completion of the course, the students will be able to:

CO-1.   Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.

CO-2.   Remember and understand basic data structures such as arrays, linked lists, stacks and queues.

CO-3.   Design and develop programs using various data structures

CO-4.   Analyze complexities for various data structures

CO-5.   Develop ability to implement different Sorting and Search methods

UNIT – I:
Introduction to Data Structures: Introduction to the Theory of Data Structures, Data Representation, Abstract Data Types, Data Types, Primitive Data Types, Data Structure and Structured Type, Atomic Type, Difference between Abstract Data Types and Data Types,
Principles of Programming and Analysis of Algorithms: Software Engineering, Program Design, Algorithms, Different Approaches to Designing an Algorithm, Introduction to Asymptotic notations Algorithm Analysis, Structured Approach to Programming, Recursion.   **(12 hrs.)**

UNIT – II:
Arrays: Introduction to Linear and Non- Linear Data Structures, One-Dimensional Arrays, Array Operations, Two- Dimensional arrays, Pointers and Arrays, an Overview of Pointers
Linked Lists: Introduction to Lists and Linked Lists, Dynamic Memory Allocation, Basic Linked List Operations, Doubly Linked List, Circular Linked List, Linked List in Arrays, Linked List versus Arrays   **(12 hrs.)**

UNIT – III:
Stacks: Introduction to Stacks, Stack as an Abstract Data Type, Representation of Stacks through Arrays, Representation of Stacks through Linked Lists, Applications of Stacks, Stacks and Recursion
Queues: Introduction, Queue as an Abstract data Type, Representation of Queues, Circular Queues, Double Ended Queues- Deques, Priority Queues, Application of Queues   **(14 hrs.)**

UNIT – IV:
Binary Trees: Introduction Binary Trees, Types of Trees, Basic Definition of Binary Trees, Properties of Binary Trees, Representation of Binary Trees, Operations on a Binary Search Tree, Binary Tree Traversal, Applications of Binary Tree   **(10 hrs.)**

UNIT – V:
Searching and sorting: Searching **-** An Introduction, Linear or Sequential Search, Binary Search.

Sorting – An Introduction, Bubble Sort, Insertion Sort, Merge Sort

Graphs: Introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs, Spanning Trees, Shortest Path, Application of Graphs.   **(12 hrs.)**

Additional Topic: Hashing searching technique, Quick sort
 TEXT BOOKS:

   1. "Data Structures using C", ISRD group Second Edition, TMH

   2. "Data Structures through C", Yashavant Kanetkar, BPB Publications

 REFERENCES:

   1. "Data Structures Using C" Balagurusamy E. TMH

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I B.Sc II Semester

DATA STRUCTURES USING C LAB

Time: 2 Hours   **Max.Marks:50**

Objectives:

The purpose of this course is to introduce to students to the field of programming in Data structures using C language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in Data Structures using C.

List of Programs:

1. Write a program to read 'N' numbers of elements into an array and also perform the following operation on an array
   a. Add an element at the begging of an array
   b. Insert an element at given index of array
   c. Update a element using a values and index
   d. Delete an existing element
2. Write a program using stacks to convert a given
   a. postfix expression to prefix
   b. prefix expression to postfix
   c. infix expression to postfix
3. Write Programs to implement the Stack operations using an array
4. Write Programs to implement the Stack operations using Liked List.
5. Write Programs to implement the Queue operations using an array.
6. Write Programs to implement the Queue operations using Liked List.
7. Write a program for arithmetic expression evaluation.
8. Write a program for Binary Search Tree Traversals
9. Write a program to implement dequeue using a doubly linked list.
10. Write a program to search an item in a given list using the following Searching Algorithms
    a. Linear Search
    b. Binary Search.
11. Write a program for implementation of the following Sorting Algorithms
    a. Bubble Sort
    b. Insertion Sort
    c. Quick Sort
12. Write a program for polynomial addition using single linked list
13. Write a program to find out shortest path between given Source Node and Destination. Node in a given graph using Dijkstrar's algorithm.
14. Write a program to implement Depth First Search graph traversals algorithm.
15. Write a program to implement Breadth First Search graph traversals algorithm

Lab Evaluation Procedure

1. Record:	**10 Marks**
2. Procedure cum Execution:	**30 Marks**
3. Viva:	**10 Marks**
Total	**50 Marks**

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I B.Sc II Semester Model paper

Paper II: DATA STRUCTURE USING C

Time: 3 Hours   **Max.Marks:60**

Section-A

I.   Answer any FIVE questions   **(5x4=20)**
1. Explain Abstract Data Types.
2. Define Linear and Non- Linear Data Structures.
3. Define Stack. What are applications of Stacks?
4. Explain about Binary Search Tree?
5. Write a C Program for Sequential Search.
6. What is Big 'O' Notation? Explain.
7. Explain binary search procedure to find key element from sorted array with an example?
8. Briefly explain various representations of Graphics.

Section-B
II.   Answer any FIVE questions   **(5x8=40)**

9. (a) What are the difference between Abstract Data Types and Data Structures?
                                    (OR)
   (b) What are the different Approaches to Designing an Algorithm?

10. (a) Define Array. How to declare two dimensional array. Write a program for addition of two matrices using arrays.

                                    (OR)
   (b) What is linked list? Explain different types of linked lists in data structures.

11. (a) What is stack? Write ADT. Explain various operations of stack.
                                    (OR)
   (b) What is a Deque? What are the different techniques used to represent Deque? Explain

12. (a) What are the Operations of a Binary Search Tree? Explain.
                                    (OR)
   (b) Explain various Binary Tree Traversal techniques.

13.(a) Explain procedure for merge sort. Derive its time complexity

                                    (OR)

   (b)Define graph traversal. Explain DFS concept with an example.

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II B.Sc III Semester Syllabus

Paper III: DATABASE MANAGEMENT SYSTEM   60hrs (4hrs/week)

Time: 3 Hours   **Max.Marks:75**

Course Objectives:

Design & develop database for large volumes & varieties of data with optimized data

processing techniques

Course Outcomes:

On Completion of the course, the students will be able to:

CO-1.   Design ER models for real time scenarios.
CO-2.   Remember and understand basic data structures such as arrays, linked lists, stacks and queues.
CO-3.   Design relational models for various real time scenarios
CO-4.   Apply various constraints on tables using SQL queries
CO-5.   Create a small database using structured query language

UNIT I: Overview of Database Management System: Introduction to data, information, database, database management systems, file-based system, Drawbacks of file-Based System, Classification of Database Management Systems, advantages of database approach, Various Data Models, Components of Database Management System, levels of database

UNIT II: Entity-Relationship Model: Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, IS A relationship and attribute inheritance, multiple inheritance, advantages of ER modelling

UNIT III: Relational Model: Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra, relational calculus, tuple relational calculus, domain relational Calculus (DRC), Functional dependencies and normal forms: 1NF, 2NF, 3NF.

UNIT IV: Structured Query Language: Introduction, History of SQL Standard, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Join Operation, Set Operations, View, Sub Query.

UNIT V PL/SQL: Introduction, Shortcomings of SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL, Program, Iterative Control, Procedure, Function, Database Triggers, Types of Triggers.

Additional Topics: Boyce Codd Normal Form (BCNF), Transactions management (ACID properties)

TEXT BOOKS:

1. Database System Concepts by Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGrawhill
2. Database Management Systems by Raghu Ramakrishnan, McGrawhill

Reference Books:

1. Principles of Database Systems by J. D. Ullman

2. Fundamentals of Database Systems by R. Elmasri and S. Navathe

3. SQL: The Ultimate Beginners Guide by Steve Tale

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II B.Sc III Semester

DATABASE MANAGEMENT SYSTEM LAB

Time: 2 Hours   **Max.Marks:50**

Objectives:

The objective of this lab course is to understand the practical applicability of database management system concepts. Working on existing database systems, designing of database, creating relational database, analysis of table design

List of Experiments:

1. Draw ER diagram for hospital administration
2. Creation of college database and establish relationships between tables
3. Relational database schema of a company is given in the following figure. Relational Database Schema - COMPANY3.
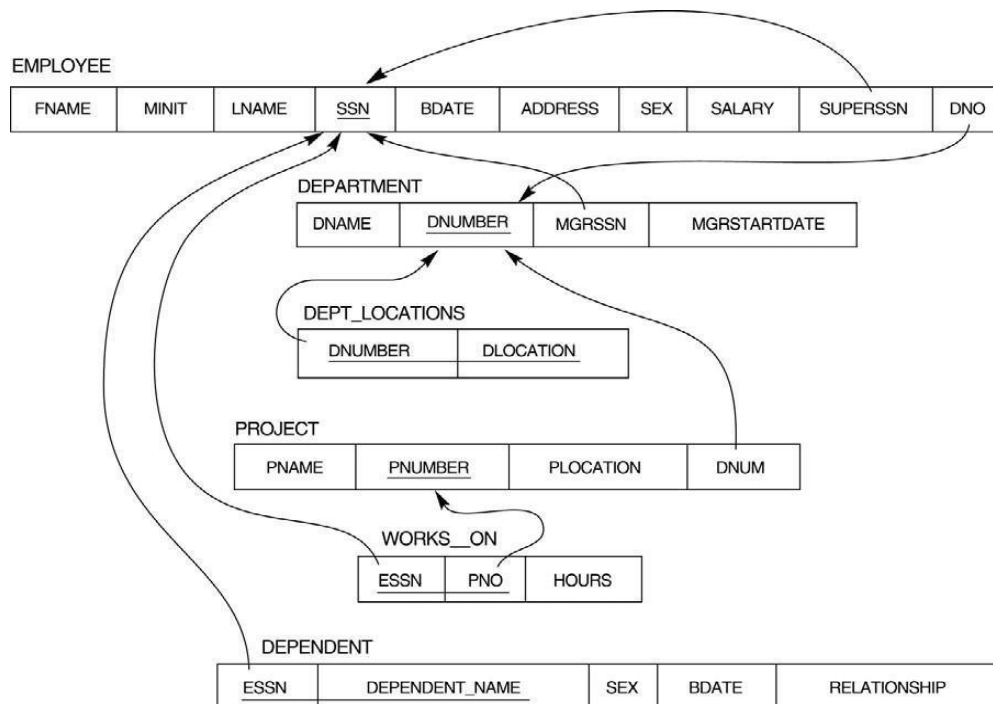
Questions to be performed on above schema

1. Create above tables with relevant Primary Key, Foreign Key and other constraints
2. Populate the tables with data
3. Display all the details of all employees working in the company.

4. Display ssn, lname, fname, address of employees who work in department no 7.
5. Retrieve the Birthdate and Address of the employee whose name is 'Franklin T.Wong'
6. Retrieve the name and salary of every employee.
7. Retrieve all distinct salary values
8. Retrieve all employee names whose address is in 'Bellaire'
9. Retrieve all employees who were born during the 1950s
10. Retrieve all employees in department 5 whose salary is between 50,000 and60,000 (inclusive)
11. Retrieve the names of all employees who do not have supervisors
12. Retrieve SSN and department name for all employees
13. Retrieve the name and address of all employees who work for the 'Research'department
14. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.
15. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
16. Retrieve all combinations of Employee Name and Department Name
17. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.
18. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.
19. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
20. Select the names of employees whose salary does not match with salary of any employee in department.
21. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
22. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings
23. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
24. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
25. Delete all dependents of employee whose ssn is '123456789'.
26. Perform a query using alter command to drop/add field and a constraint in Employeetable.

Lab Evaluation Procedure

1. Record: **10 Marks**

2. Procedure cum Execution: **30 Marks**

3. Viva: **10 Marks**

         Total   **50 Marks**

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II B.Sc III Semester Model Paper

Paper III: DATABASE MANAGEMENT SYSTEM

Time: 3 Hours   **Max.Marks:75**

Section - A

Answer any 5 question   **5X5 = 25M**

1. Explain disadvantages of file processing system?

2. Explain the concept of entity and entity set with suitable example.

3. Explain about various attribute classification.

4. What are the advantages of Relational algebra? Explain.

5. Explain various types of keys.

6. How can we use selection and projection operations?

7. Explain various aggregate functions.

8. Explain structure of PL/SQL.

Section - B

Answer following question   **5X10 = 50M**

9. a) With a neat diagram, explain the architecture of a DBMS.

(OR)

b) Define data model. Explain various data models.

10. a) Explain about Specialization and Generalization in EER model.

(OR)

b) What is ER-Modeling? Explain advantages of ER-Modelling.

11. a) What is Functional Dependency? Explain difference between 3NF and BCNF?

(OR)

b) What is relational model? Write about key features of relational model.

12. a) What is SQL? Explain DDL and DML commands.

(OR)

   b) What is Nested Queries? How to create them? Discuss it with relevant example.

13. a) Explain steps in creating a PL/SQL Program.

(OR)

   b) Explain about Triggers and types of triggers.

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II B.Sc IV Semester Syllabus

Paper IV: OBJECT ORIENTED PROGRAMMING USING JAVA   60hrs (4hrs/week)

Time: 3 Hours   **Max.Marks:75**

Course Objectives:

To introduce the fundamental concept of Object Oriented Programming and to emphasize the importance of Object Oriented concepts in Java Programming.

Course Outcomes:

On Completion of the course, the students will be able to:

CO-1.   Understand the benefits of a well-structured program and features of java
CO-2.   Understand underlying principles of Object-Oriented Programming in Java
CO-3.   Develop problem-solving and programming skills using OOP concepts
CO-4.   Apply keywords of exception handling and OOP principles in solving real time problems
CO-5.   Develop the ability to solve real-world problems through software development in high-level programming language like Java

UNIT I:

Introduction to Java: Features of Java, The Java virtual Machine, Parts of Java

Naming Conventions and Data Types: Naming Conventions in Java, Data Types in Java, Literals **Operators in Java**: Operators, Priority of Operators. **Control Statements in Java**: if... else Statement, do... while Statement, while Loop, for Loop, switch Statement, break Statement, continue Statement, and return Statement. **Input and Output:** Accepting Input from the Keyboard, Reading Input with Java.util.Scanner Class, Displaying Output with System.out.printf(), Displaying Formatted Output with String.format(). **Arrays:** Types of Arrays, Three Dimensional Arrays (3D array), and array name. length, Command Line Arguments   **(12 hrs.)**

UNIT II:

Strings: Creating Strings, String Class Methods, String Comparison, Immutability of Strings.
Introduction to OOPs: Problems in Procedure Oriented Approach, Features of Object- Oriented Programming System (OOPS).
Classes and Objects: Object Creation, Initializing the Instance Variables, Access Specifiers Constructors.
Methods in Java: Method Header or Method Prototype, Method Body, Understanding Methods, Static Methods, Static Block, The keyword 'this', Instance Methods, Passing Primitive Data Types to Methods, Passing Objects to Methods, Passing Arrays to Methods, Recursion, Factory Methods.

Inheritance: Inheritance, The keyword 'super', The Protected Specifier, Types of Inheritance.**(12 hrs.)**

UNIT III:

Polymorphism: Polymorphism with Variables, Polymorphism using Methods, Polymorphism with Static Methods, Polymorphism with Private Methods, Polymorphism with Final Methods, final Class. **Type Casting**: Types of Data Types, Casting Primitive Data Types, Casting Referenced Data Types, The Object Class. **Abstract Classes**: Abstract Method and Abstract Class.
Interfaces: Interface, Multiple Inheritance using Interfaces. **Packages:** Package, Different Types of Packages, The JAR Files, Interfaces in a Package, Creating Sub Package in a Package, Access Specifiers in Java, Creating API Document. **Exception Handling:** Errors in Java Program, Exceptions, throws Clause, throw Clause, Types of Exceptions, Re – throwing an Exception. **(12 hrs.)**

UNIT – IV

Streams: Stream, Creating a File using FileOutputStream, Reading Data from a File using FileInputStream, Creating a File using FileWriter, Reading a File using FileReader, Zipping and Unzipping Files, Serialization of Objects, Counting Number of Characters in a File, File Copy, File Class

Threads: Single Tasking, Multi-Tasking, Uses of Threads, Creating a Thread and Running it, Terminating the Thread, Single Tasking Using a Thread, Multi-Tasking Using Threads, Multiple Threads Acting on Single Object, Thread Class Methods, Deadlock of Threads, Thread Communication, Thread Priorities, thread Group, Daemon Threads, Applications of Threads, Thread Life Cycle. **(12 hrs.)**

UNIT V:

Applets: Creating an Applet, Uses of Applets, <APPLET> tag, A Simple Applet, An Applet with Swing Components, Animation in Applets, A Simple Game with an Applet, Applet Parameters.
Java Database Connectivity: Database Servers, Database Clients, JDBC (Java Database Connectivity), Working with Oracle Database, Working with MySQL Database, Stages in a JDBC Program, Registering the Driver, Connecting to a Database, Preparing SQL Statements, Using jdbc– odbc Bridge Driver to Connect to Oracle   Database, Retrieving Data from MySQL Database, Retrieving Data from MS Access Database, Stored Procedures and Callable Statements, Types of Result Sets. **(12 hrs.)**

TEXT BOOKS:

1. Core Java: An Integrated Approach, Authored by Dr. R. Nageswara Rao &Kogent Learning Solutions Inc.

2. E.Balaguruswamy, Programming with JAVA, A primer, 3e, TATA McGraw- HillCompany.

REFERENCES:

1. John R. Hubbard, Programming with Java, Second Edition, Schaum's outlineSeries, TMH.

2. Deitel&Deitel. Java TM: How to Program, PHI (2007)

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II B.Sc IV SEMESTER

OBJECT ORIENTED PROGRAMMING USING JAVA LAB

Time: 2 Hours   **Max.Marks:50**

Objectives:

The purpose of this Lab course is to introduce to students to the field of programming in Object Oriented Programming. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in JAVA.

List of Experiments:
1. Write a program to read *Student Name, Reg.No, Marks [5]* and calculate *Total*,*Percentage, Result*. Display all the details of students
2. Write a program to perform the following String Operations
    a. Read a string
    b. Find out whether there is a given substring or not
    c. Compare existing string by another string and display status
    d. Replace existing string character with another character
    e. Count number of works in a string
3. Java program to implements Addition and Multiplication of two N X N matrices.
4. Java program to demonstrate the use of Constructor.
5. Calculate area of the following shapes using method overloading.
    a. Triangle
    b. Rectangle
    c. Circle
    d. Square
6. Implement inheritance between *Person (Aadhar, Surname, Name, DOB, and Age)* and *Student (Admission Number, College, Course, Year)* classes where ReadData(),DisplayData() are overriding methods.
7. Java program for implementing Interfaces
8. Java program on Multiple Inheritance.
9. Java program for to display *Serial Number from 1 to N* by creating two Threads
10. Java program to demonstrate the following exception handlings
    e. Divided by Zero
    f. Array Index Out of Bound
    g. File Not Found
    h. Arithmetic Exception
    i. User Defined Exception

11. Create an Applet to display different shapes such as Circle, Oval, Rectangle, Square and Triangle.
12. Write a program to create *Book (ISBN,Title, Author, Price, Pages, Publisher)*structure and store book details in a file and perform the following operations
    j. Add book details

    k. Search a book details for a given ISBN and display book details, if available

    l. Update a book details using ISBN

    m. Delete book details for a given ISBN and display list of remaining Books

Lab Evaluation Procedure

1. **Record:** **10 Marks**

2. **Procedure cum Execution:** **30 Marks**

3. **Viva:** **10 Marks**

       Total **50 Marks**

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(W.e.f. 2020-21 Admitted Batch)
II B.Sc IV SEMESTER MODEL PAPER

OBJECT ORIENTED PROGRAMMING USING JAVA

Time: 3 Hours   **Max.Marks:75**

Section - A

Answer any 5 question   **5X5 = 25M**

1. Explain about JVM architecture.

2. Define a string. Explain string class methods.

3. Explain the usage of 'this' keyword with example.

4. Explain about Type casting with example.

5. Differentiate Abstract class Interface.

6. Explain Zipping and Unzipping files.

7. Define a thread. Write a program for creating a thread.

8. Explain the concept of JDBC.

Section - B

Answer following question   **5X10 = 50M**

9. a) Explain primitive data types in java.

(OR)

b) Explain various operators in java with examples.

10. a) Define inheritance. What types of Inheritance? Write a program for multi-level inheritance

(OR)

b) Define constructor and its types. Explain parameterized constructor with an example.

11. a) Explain the concept of polymorphism. Write a program for method overloading

(OR)

b) What is an exception? Explain key words in exception handling.

12. a) Explain the concept of creating a file using FileWriter with an example program.

(OR)

b) Explain the method in Thread Life Cycle with diagram.

13. a) Define Applet. Explain how to create an Applet.

(OR)

b) Explain the procedure to connect Oracle Database using jdbc-odbc driver.

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II B.Sc IV SEMESTER SYLLABUS

Paper V: OPERATING SYSTEMS   60hrs (4hrs/week)

Time: 3 Hours   **Max.Marks:75**

Course Objectives:

This course aims to introduce the structure and organization of a file system. It emphasizes various functions of an operating system like memory management, process management, device management, etc

Course Outcomes:

On Completion of the course, the students will be able to:

CO-1. Understand Operating System Architectural design and its services
CO-2. Understand various process management concepts including scheduling, threading
CO-3. Apply process scheduling techniques to efficiently run various applications
CO-4. Analyze the concept of memory management techniques
CO-5. Create various files in local host using file management concept and protect files using software

UNIT I:

What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.   **(12 hrs.)**

UNIT II:

Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling, Non-Pre-emptive and Pre-emptive Scheduling Algorithms.   **(12 hrs.)**

UNIT III:

Process Management: Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery. Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter- process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.   **(14 hrs.)**

UNIT IV:

Memory Management: Physical and Virtual Address Space; Memory Allocation Strategies– Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory.   **(10 hrs.)**

UNIT V:

File and I/O Management, OS Security : Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared Memory, Security Policy Mechanism, Protection, Authentication and Internal Access Authorization Introduction to Android Operating System, Android Development Framework, Android Application Architecture, Android Process Management and File System, Small Application Development using Android Development Framework.   **(12 hrs.)**

Additional Topics: Disk scheduling techniques

TEXT BOOKS:

1. Operating System Principles by Abraham Silberschatz, Peter Baer Galvin and GregGagne (7thEdition) Wiley India Edition.

2. Operating Systems: Internals and Design Principles by Stallings (Pearson)

    REFERENCES:

1. Operating Systems by J. Archer Harris (Author), Jyoti Singh (Author) (TMH)
2. Online Resources for UNIT V

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II B.Sc IV SEMESTER

OPERATING SYSTEM USING C/JAVA LAB

Time: 2 Hours   **Max.Marks:50**

Objectives:

To write the code to implement and modify various concepts in operating systems

List of Experiments:

1. Write a program to implement Round Robin CPU Scheduling algorithm

2. Simulate SJF CPU Scheduling algorithm

3. Write a program the FCFS CPU Scheduling algorithm

4. Write a program to Priority CPU Scheduling algorithm

5. Simulate Sequential file allocation strategies

6. Simulate Indexed file allocation strategies

7. Simulate Linked file allocation strategies

8. Simulate MVT and MFT memory management techniques

9. Simulate Single level directory File organization techniques

10. Simulate Two level File organization techniques

11. Simulate Hierarchical File organization techniques

12. Write a program for Bankers Algorithm for Dead Lock Avoidance

13. Implement Bankers Algorithm Dead Lock Prevention.

14. Simulate all Page replacement algorithms.

    a) FIFO

    b) LRU

    c) LFU

15. Simulate Paging Techniques of memory management

Lab Evaluation Procedure

4. Record: **10 Marks**

5. Procedure cum Execution: **30 Marks**

6. Viva: **10 Marks**

        Total   **50 Marks**

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II B.Sc IV SEMESTER MODEL PAPER

Paper V: OPERATING SYSTEM

Time: 3 Hours   **Max.Marks:75**

Section - A

Answer any 5 question   **5X5 = 25M**

1. Define operating system. Explain batch operating system.

2. What is process? Explain process states.

3. Explain threading issues.

4. Define semaphore. Explain types of semaphore.

5. What are characteristics of deadlock? Explain briefly

6. Explain about Virtual memory.

7. Explain physical and logical address space.

8. Write about file types.

Section - B

Answer following question   **5X10 = 50M**

9. a) Define operating system. Explain various types of operating systems.

(OR)

b) What is operating system? Explain functions of operating system.

10. a) Define thread. Differentiate user level and kernel level threads.

(OR)

b) Define preemption. What are various preemptive algorithms? Discuss briefly?

11. a) Define deadlock. What are necessary conditions for deadlock to occur?

(OR)

b) Discuss classical process synchronization problems.

12. a) Explain the following

    i) Segmentation

    ii) Fixed and variable partitions.

(OR)

b) Explain the concept of paging with example.

13. a) What are various file operations? Explain File allocation methods.

(OR)

b) Explain Android Development Framework.

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IV B. Sc.(Hons) – V Semester Syllabus
Paper 6A: Web Interface Designing Technologies 60hrs (3hrs/week)

Time: 3Hours   **Max.Marks:75**

Course Objective:
The aim of this course is to User Interface (UI) Design focuses on anticipating what users might need to do and ensuring that the interface has elements that are easy to access, understand, and use to facilitate those actions.

Course Outcomes:
On Completion of the course, the students will be able to:

CO-1. Understand and appreciate the web architecture and services.
CO-2. Gain knowledge about various components of a website.
CO-3. Demonstrate skills regarding creation of a static website and an interface to dynamicwebsite.
CO-4. Learn how to install word press and gain the knowledge of installing various pluginsto use in their websites.

UNIT - I (12 hours)
HTML: Introduction to web designing, difference between web applications and desktop applications, introduction to HTML, HTML structure, elements, attributes, headings, paragraphs, styles, colours, HTML formatting, Quotations, Comments, images, tables, lists, blocks and classes, HTML CSS, HTML frames, file paths, layout, symbols, HTML responsive.

UNIT – II (12 hours)
HTML forms: HTML form elements, input types, input attributes, HTML5, HTML graphics, HTML media – video, audio, plug INS, you tube.
HTML API'S: Geo location, Drag/drop, local storage, HTML SSE.
CSS: CSS home, introduction, syntax, colours, back ground, borders, margins, padding, height/width, text, fonts, icons, tables, lists, position, over flow, float, CSS combinators, pseudo class, pseudo elements, opacity, tool tips, image gallery, CSS forms, CSS counters, CSS responsive.

UNIT – III (12 hours)
Client side Validation: Introduction to JavaScript - What is DHTML, JavaScript, basics, variables, string manipulations, mathematical functions, statements, operators, arrays, functions. Objects in JavaScript - Data and objects in JavaScript, regular expressions, exception handling. DHTML with JavaScript - Data validation, opening a new window, messages and confirmations, the status bar, different frames, rollover buttons, moving images.

UNIT – IV (12 hours)
Word press: Introduction to word press, servers like wamp, bitnami e.tc, installing and configuring word press, understanding admin panel, working with posts and pages, using editor, text formatting with shortcuts, working with media-Adding, editing, deleting media elements, working with widgets, menus.

UNIT – V (12 hours)
Working with themes-parent and child themes, using featured images, configuring settings, user and user roles and profiles, adding external links, extending word press with plug-ins. Customizing the site, changing the appearance of site using css , protecting word press website from hackers.

TEXT BOOKS:

1. Chris Bates, Web Programming Building Internet Applications, Second Edition,Wiley (2007)
2. Paul S.WangSanda S. Katila, an Introduction to Web Design plus Programming,Thomson (2007).
3. Head First HTML and CSS, Elisabeth Robson, Eric Freeman, O'Reilly Media Inc.
4. An Introduction to HTML and JavaScript: for Scientists and Engineers, David R.Brooks. Springer, 2007
5. Schaum's Easy Outline HTML, David Mercer, Mcgraw Hill Professional.
6. Word press for Beginners, Dr.Andy Williams.
7. Professional word press, Brad Williams, David damstra, Hanstern.
8. Web resources:
   a. http://www.codecademy.com/tracks/web
   b. http://www.w3schools.com
   c. https://www.w3schools.in/wordpress-tutorial/
   d. http://www.homeandlearn.co.uk
9. Other web sources suggested by the teacher concerned and the college librarianincluding reading material.

II. Co-Curricular Activities

a) **Mandatory:** *(Training of students by teacher in field related skills: (lab: 10 + field: 05) :*

1. **For Teacher**: Field related training of students by the teacher in laboratory/field for not less than 15 hours on identifying the case study to build a website, designing the format, structure, menus, submenus etc for a website and finally to build a website.

2. **For Student**: Students shall (individually) search online and visit any of the agencies like hotels, hospitals, super bazaars, organizations, etc. where there is a need for a website and identify any one case study and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. Example: Choosing a firmor business to develop a website, identifying various business entities to be included in the website, identifying menu bar and content to be placed in their websites.

3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work:*Title page, student details, index page, details of place visited, observations, findings andacknowledgements*.

5. Unit tests (IE).

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IV B. Sc.(Hons) – V Semester

Paper 6A: Web Interface Designing Technologies lab 30hrs (3hrs/week)

Time:2Hours   **Max.Marks:50**

Objecives:

1. Create a basic website with the help of HTML and CSS.

2. Acquire the skill of installing word press and various plugins of Word press.

3. Create a static website with the help of Word press.

4. Create an interface for a dynamic website.

5. Apply various themes for their websites using Word press.

List of Programs:
HTML and CSS:
1.Create an HTML document with the following formatting options:

(a) Bold, (b) Italics, (c) Underline, (d) Headings (Using H1 to H6 heading styles), (e) Font (Type, Size and Color), (f) Background (Colored background/Image in background), (g) Paragraph, (h) Line Break, (i) Horizontal Rule, (j) Pre tag

2. Create an HTML document which consists of:
   (a)Ordered List (b) Unordered List (c) Nested List (d) Image

3. Create a Table with four rows and five columns. Place an image in one column.
4. Using "table" tag, align the images as follows:

5.Create a menu form using html.

6. Style the menu buttons using css.

7. Create a form using HTML which has the following types of controls:

   • Text Box (b) Option/radio buttons (c) Check boxes (d) Reset and Submit buttons

8. Embed a calendar object in your web page.

9. Create an applet that accepts two numbers and perform all the arithmetic

Operations on them.

10. Create nested table to store your curriculum.

11. Create a form that accepts the information from the subscriber of a mailing system.

12. Design the page as follows:
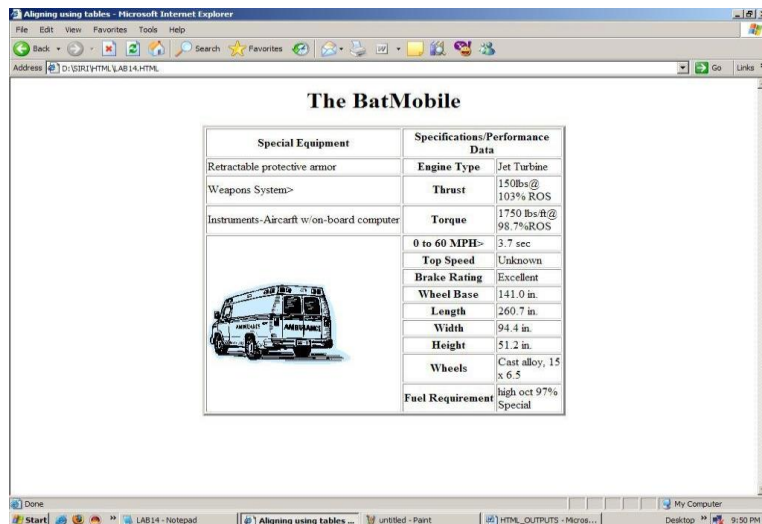
13. Create a help file as follows:
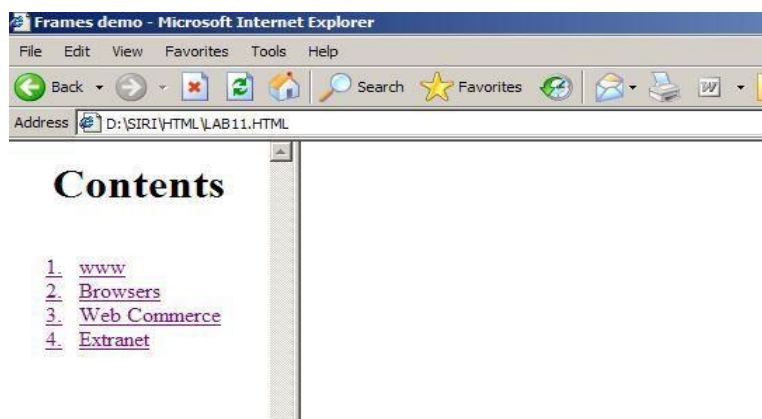
14. Create a webpage containing your bio data (assume the form and fields).

15. Write a html program including style sheets.

16. Write a html program to layers of information in web page.

17. Create a static webpage.

Word press:

18. Installation and configuration of word press.

19. Create a site and add a theme to it.

20. 20 Create a child theme

21. Create five pages on COVID – 19 and link them to the home page. .

22. Create a simple post with featured image.

23. Add an external video link with size 640 X 360.

24. Create a user and assign a role to him.

25. Create a login page to word press using custom links

26. Create a website for your college.

Lab Evaluation Procedure

1. **Record:**		**10 Marks**
2. **ProcedurecumExecution:**		**30 Marks**
3. **Viva:**		**10 Marks**
	Total	**50 Marks**

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IV B. Sc.(Hons) – V Semester Syllabus

Paper 7A: Web Applications Development using PHP & MYSQL 60hrs (3hrs/week)

Time:3 Hours **Max.Marks:75**

Course Objective:

PHP is a fast and feature-rich open source scripting language used to develop Web Applications or Internet / Intranet Applications.

Course Outcomes:

On Completion of the course, the students will be able to:

CO-1. Write simple programs in PHP.

CO-2. Understand how to use regular expressions, handle exceptions, and validate data usingPHP.

CO-3. Apply In-Built functions and Create User defined functions in PHP programming.

CO-4. Write PHP scripts to handle HTML forms.

CO-5. Write programs to create dynamic and interactive web based applications using PHPand MYSQL.

UNIT - I (12 hours)

The Building blocks of PHP: Variables, Data Types, Operators and Expressions, Constants. Flow Control Functions in PHP: Switching Flow, Loops, Code Blocks and Browser Output. Working with Functions: What is function?, Calling functions, Defining Functions, Returning the values from User-Defined Functions, Variable Scope, Saving state between Function calls with the static statement, more about arguments.

UNIT – II (12 hours)

Working with Arrays: What are Arrays? Creating Arrays, Some Array-Related Functions. Working with Objects: Creating Objects, Object Instance Working with Strings, Dates and Time: Formatting strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP.

UNIT – III (12 hours)

Working with Forms: Creating Forms, Accessing Form Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, and Working with File Uploads. Working with Cookies and User Sessions: Introducing Cookies, Setting a Cookie with PHP, Session Function Overview, Starting a Session, Working with session variables, passing session IDs in the Query String, Destroying Sessions and Unsetting Variables, Using Sessions in an Environment with Registered Users.

UNIT – IV (12 hours)

Working with Files and Directories: Including Files with inclue(), Validating Files, Creating and Deleting Files, Opening a File for Writing, Reading or Appending, Reading from Files, Writing or Appending to a File, Working with Directories, Open Pipes to and from Process Using popen(), Running Commands with exec(), Running Commands with system() or passthru().

Working with Images: Understanding the Image-Creation Process, Necessary Modifications to PHP, Drawing a New Image, Getting Fancy with Pie Charts, Modifying Existing Images, Image Creation from User Input.

Interacting with MySQL using PHP: MySQL Versus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data. Creating an Online Address Book: Planning and Creating Database Tables, Creating Menu, Creating Record Addition Mechanism, Viewing Records, Creating the Record Deletion Mechanism, Adding Sub-entities to a Record.

TEXT BOOKS:

1. Julie C. Meloni, SAMS Teach yourself PHP MySQL and Apache, PearsonEducation (2007).
2. Steven Holzner , PHP: The Complete Reference, McGraw-Hill
3. Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, Third EditionO'reilly, 2014
4. Xue Bai Michael Ekedahl, The web warrior guide to Web Programming, Thomson(2006).
5. Web resources:
   e. http://www.codecademy.com/tracks/php
   f. http://www.w3schools.com/PHP
   g. http://www.tutorialpoint.com

6. Other web sources suggested by the teacher concerned and the college librarian including reading material.

Co-Curricular Activities:

a) **Mandatory:** *(Training of students by teacher in field related skills: (lab: 10 + field: 05) :*

1. **For Teacher**: Field related training of students by the teacher in laboratory/field for not less than 15 hours on demonstrating various **interactive and dynamic websites** available online, addressing the students on identifying the case study to build an interactive and database driven website, forms to be used in website, database to be maintained, reports to be produced, etc.

2. **For Student**: Students shall (individually) search online and visit any of the agencies like malls, hotels, super bazaars, etc. where there is a need for an interactive and database driven website and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. Example: Choosing a firm or business to develop a website, identifying forms to be placed in the websites, back end databases to be maintained and reports to be generated and placed in the websites.

3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work:*Title page, student details, index page, details of place or websites visited, structure of the website and acknowledgements*.

5. Unit tests (IE).

b) Suggested Co-Curricular Activities

- Arrange expert lectures by IT experts working professionally in the area of web contentdevelopment
- Assignments (in writing or implementing contents related to syllabus or outside thesyllabus. Shall be individual and challenging)
- Seminars, Group discussions, Quiz, Debates etc. (on related topics).
- Preparation by students on best websites.
- Arrange a webpage development competition among small groups of students.

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IV B. Sc.(Hons) – V Semester

Paper 7A: Web Applications Development using PHP & MYSQL lab 30hrs (3hrs/week)

Time:2Hours   **Max.Marks:50**

Objecives:

1.   Write, debug and implement the Programs by applying concepts and error handlingtechniques of PHP.
2.   Create an interactive and dynamic website.
3.   Create a website with reports generated from a database.
4.   Write programs to create an interactive website for e-commerce sites like onlineshopping, etc.

List of Programs:

1.Write a PHP program to Display "Hello"

2. Write a PHP Program to display the today's date.

3. Write a PHP program to display Fibonacci series.

4.Write a PHP Program to read the employee details.

5.Write a PHP program to prepare the student marks list.

6.Write a PHP program to generate the multiplication of two matrices.

7.Create student registration form using text box, check box, radio button, select,submit button. And display user inserted value in new PHP page.

8.Create Website Registration Form using text box, check box, radio button, select,submit button. And display user inserted value in new PHP page.

9.Write PHP script to demonstrate passing variables with cookies.

10.Write a program to keep track of how many times a visitor has loaded the page.

11.Write a PHP application to add new Rows in a Table.

12.Write a PHP application to modify the Rows in a Table.

13.Write a PHP application to delete the Rows from a Table.

14.Write a PHP application to fetch the Rows in a Table.

15.Develop an PHP application to implement the following Operations.

      i.   Registration of Users.

      ii.   Insert the details of the Users.

      iii.   Modify the Details.

      iv.   Transaction Maintenance.

          a)   No of times Logged in

          b)   Time Spent on each login.

          c)   Restrict the user for three trials only.

          d)   Delete the user if he spent more than 100 Hrs of transaction.

16.Write a PHP script to connect MySQL server from your website.

17.Write a program to read customer information like cust-no, cust-name, item- purchased, and mob-no, from customer table and display all these information in table format on output screen.

18.Write a program to edit name of customer to "Kiran" with cust-no =1, and to delete record with cust-no=3.

19.Write a program to read employee information like emp-no, emp-name, designation and salary from EMP table and display all this information using table format inyour website.

20.Create a dynamic web site using PHP and MySQL.

Lab Evaluation Procedure

1. **Record:**	**10 Marks**	
2. **ProcedurecumExecution:**	**30 Marks**	
3. **Viva:**	**10 Marks**	
Total	**50 Marks**	

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(W.e.f. 2020-21 Admitted Batch)
IV B. Sc.(Hons) – V Semester Syllabus
Paper 6B: INTERNET OF THINGS   60hrs (3hrs/week)

Time:3Hours   **Max.Marks:75**

Course Objective:

   The goal behind the Internet of things is to have devices that self report in real-time, improving efficiency and bringing important information to the surface more quickly than a system depending on human intervention.

Course Outcomes:

 On Completion of the course, the students will be able to:

CO-1. Appreciate the technology for IoT
CO-2. Understand various concepts, terminologies and architecture of IoT systems.
CO-3. Understand various applications of IoT
CO-4. Learn how to use various sensors and actuators for design of IoT.
CO-5. Learn how to connect various things to Internet.

UNIT - I (12 hours)

Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

Applications of IoT: Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

UNIT – II (12 hours)

Sensors Networks : Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

UNIT – III (12 hours)

Wireless Technologies for IoT: WPAN Technologies for IoT: IEEE 802.15.4, Zigbee,HART, NFC, Z-Wave, BLE, Bacnet And Modbus.

IP Based Protocols for IoT IPv6, 6LowPAN, LoRA, RPL, REST, AMPQ, CoAP, MQTT.Edge connectivity and protocols.

UNIT – IV (12 hours)

Arduino Simulation Environment: Arduino Uno Architecture, Setting up the IDE, Writing Arduino Software, Arduino Libraries, Basics of Embedded C programming for Arduino, Interfacing LED, push button and buzzer with Arduino, Interfacing Arduino with LCD.

Sensor & Actuators with Arduino: Overview of Sensors working, Analog and DigitalSensors, Interfacing of Temperature, Humidity, Motion, Light and Gas Sensors with Arduino, Interfacing of Actuators with Arduino, Interfacing of Relay Switch and Servo Motor with Arduino.

UNIT – V (12 hours)

Developing IOT's: Implementation of IoT with Arduino, Connecting and using various IoT Cloud Based Platforms such as Blynk, Thingspeak, AWS IoT, Google Cloud IoT Core etc. Cloud Computing, Fog Computing, Privacy and Security Issues in IoT.

TEXT BOOKS:

1.Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-onApproach)", 1st Edition, VPT, 2014
2. Daniel Minoli, — "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
3. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press

5.Open source software / learning websites
    a. https://github.com/connectIOT/iottoolkit
    b. https://www.arduino.cc/
    c. https://onlinecourses.nptel.ac.in/noc17_cs22/course
    d. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html
    e. Contiki (Open source IoT operating system)
    f. Ardudroid (open source IoT project)
    g. https://blynk.io (Mobile app)
    h. IoT Toolkit (smart object API gateway service reference implementation)

6. Other web sources suggested by the teacher concerned and the college librarian including reading material.

Co-Curricular Activities:

a) **Mandatory:** *(Training of students by teacher in field related skills: (lab: 10 + field: 05) :*

1. **For Teacher**: Field related training of students by the teacher in laboratory/field for not less than 15 hours on identifying the case study for the IoT, design an IoT solution, build physical IoT device, connect it to a mobile app and deploy the IoT device.

2. **For Student**: Students shall (individually) search online and visit any of the places like aquaculture farms, agencies using IOT devices, etc to identify problems for IoT solution and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. Example: Choosing a Problem for IoT solution (agriculture, aquaculture, smart home appliances, testing moisture levels, oxygen levels, etc), reasons why IoT solution is feasible for the said problem, material required, Design and architecture forthe proposed IoT device, method of implementation and how to connect the device to mobile.

3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, details of websites searched, place visited, observations, findings, proposed IOT problem, and design of the IOT device, implementation and acknowledgements*.

5. Unit tests (IE).

b) Suggested Co-Curricular Activities

- Training of students by related industrial experts.
- Assignments
- Preparation and presentation of power-point slides, which include videos, animations,pictures, graphics, etc by the students.
- Seminars, Group discussions, Quiz, Debates etc. (on related topics).
- Field visits to identify the problems for IOT solutions.

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IV B. Sc.(Hons) – V Semester

Paper 6B: INTERNET OF THINGS lab 30hrs (3hrs/week)

Time:2Hours   **Max.Marks:50**

Objecives:

1. Acquire the skills to design a small IoT device.
2. Connect various sensors, actuators, etc to Arduino board.
3. Connect the things to Internet
4. Design a small mobile app to control the sensors.
5. Deploy a simple IoT device.

List of Programs:

1. Understanding Arduino UNO Board and Components
2. Installing and work with Arduino IDE
3. Blinking LED sketch with Arduino
4. Simulation of 4-Way Traffic Light with Arduino
5. Using Pulse Width Modulation
6. LED Fade Sketch and Button Sketch
7. Analog Input Sketch (Bar Graph with LEDs and Potentiometre)
8. Digital Read Serial Sketch (Working with DHT/IR/Gas or Any other Sensor)
9. Working with Adafruit Libraries in Arduino
10. Spinning a DC Motor and Motor Speed Control Sketch
11. Working with Shields
12. Design APP using Blink App or Things peak API and connect it LED bulb.
13. Design APP Using Blynk App and Connect to Temperature, magnetic Sensors.

Lab Evaluation Procedure

4. **Record:**		**10 Marks**
5. **ProcedurecumExecution:**		**30 Marks**
6. **Viva:**		**10 Marks**
	Total	**50 Marks**

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IV B. Sc.(Hons) – V Semester Syllabus
Paper 7B: APPLICATION DEVELOPMENT USING PYTHON 60hrs (3hrs/week)

Time:3Hours   **Max.Marks:75**

Course Objective:

Python is an open-source programming language that is great for creating web and mobile apps. Applications like Instagram and Dropbox are built using Python.

Course Outcomes:

On Completion of the course, the students will be able to:

CO-1. Understand and appreciate the web architecture and services.
CO-2. Examine Python syntax and semantics and be fluent in the use of Python flow controland functions.
CO-3. Demonstrate proficiency in handling Strings and File Systems.
CO-4. Create, run and manipulate Python Programs using core data structures like Lists,Dictionaries and use Regular Expressions.
CO-5. Interpret the concepts of Object-Oriented Programming as used in Python.

UNIT - I (12 hours)

Python basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types
Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules.
Sequences - Strings, Lists, and Tuples, Mapping and Set Types.

UNIT – II (12 hours)

Files: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules.
Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules
Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules.

UNIT – III (12 hours)

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules.

UNIT – IV (12 hours)

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs.
Web Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced

Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application, Advanced CGI, Web (HTTP) Servers.

UNIT – V (12 hours)

Database Programming: Introduction, Python Database Application Programmer's Interface (DBAPI), Object Relational Managers (ORMs), Related Modules.

TEXT BOOKS:

1. **C**ore Python Programming, Wesley J. Chun, Second Edition, Pearson.
2. Think Python, Allen Downey, Green Tea Press.
3. Introduction to Python, Kenneth A. Lambert, Cengage.
4. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
5. Learning Python, Mark Lutz, O' Really.
6. Web sources suggested by the teacher concerned and the college librarian includingreading material.

Co-Curricular Activities:

a) **Mandatory:** *(Training of students by teacher in field related skills: (lab: 10 + field: 05)*

1. **For Teacher**: Training of students by the teacher in laboratory/field for not less than 15 hours on field related skills like building an IOT device with the help of Python.

2. **For Student**: Students shall (individually) identity the method to link their IOT project done in Paper 7A with Python and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. It should include a brief report on the selected case study of IOT device, algorithm and Python program to operate the IOT device.

3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, design of the IOT device, implementation of Python program to connect the IOT device, findings and acknowledgements*.

5. Unit tests (IE).

Suggested Co-Curricular Activities

- Training of students by related industrial experts.
- Assignments
- Seminars, Group discussions, Quiz, Debates etc. (on related topics).
- Presentation by students on best websites.

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IV B. Sc.(Hons) – V Semester

Paper 7B: APPLICATION DEVELOPMENT USING PYTHON lab **30hrs (3hrs/week)**

Time:2Hours   **Max.Marks:50**

Objecives:

- Implement simple programs in Python
- Implement programs related to various data structures like lists, dictionaries, etc.
- Implement programs related to files.
- Implement applications related to databases, Web services and IOT.

List of Programs:

1. Write a menu driven program to convert the given temperature from Fahrenheit toCelsius and vice versa depending upon user's choice.
2. Write a python program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign gradesaccording to the following criteria :
   Grade A: Percentage >=80
   Grade B: Percentage>=70 and <80 Grade C:
   Percentage>=60   and   <70   Grade   D:
   Percentage>=40   and   <60   Grade   E:
   Percentage<40
3. Write a python program to display the first n terms of Fibonacci series.
4. Write a python program to calculate the sum and product of two compatible matrices.
5. Write a function that takes a character and returns True if it is a vowel and Falseotherwise.
6. Write a menu-driven program to create mathematical 3D objects
   - I.   curve
   - II.   sphere
   - III.   cone
   - IV.   arrow
   - V.   ring
   - VI.   Cylinder.

7. Write a python program to read n integers and display them as a histogram.

8. Write a python program to display sine, cosine, polynomial and exponential curves.

9. Write a python program to plot a graph of people with pulse rate p vs. height h. Thevalues of P and H are to be entered by the user.
10. Write a python program to calculate the mass m in a chemical reaction. The mass m(in gms) disintegrates according to the formula m=60/ (t+2), where t is the time in hours. Sketch a graph for t vs. m, where t>=0.

11. A population of 1000 bacteria is introduced into a nutrient medium. The population pgrows as follows:
P (t) = (15000(1+t))/ (15+ *e)*

12. Where the time t is measured in hours. WAP to determine the size of the population atgiven time t and plot a graph for P vs t for the specified time interval.

13. Input initial velocity and acceleration, and plot the following graphs depictingequations of motion:
    VII.   velocity wrt time (v=u+at)
    VIII. distance wrt time (s=u*t+0.5*a*t*t)
    IX.   distance wrt velocity (s=(v*v-u*u)/2*a)

14. Write a program that takes two lists and returns True if they have at least one commonmember.

15. Write a Python program to print a specified list after removing the 0th, 2nd, 4th and5th elements.

16. Write a program to implement exception handling.

17. Try to configure the widget with various options like: bg="green", family="times",size=20.

18. Write a Python program to read last 5 lines of a file.

19. Design a simple database application that stores the records and retrieve the same

20. Design a database application to search the specified record from the database.

21. Design a database application to that allows the user to add, delete and modify therecords.

Lab Evaluation Procedure

1. **Record:**   **10 Marks**

2. **ProcedurecumExecution:**   **30 Marks**

3. **Viva:**   **10 Marks**

                 Total   **50 Marks**

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IV B. Sc.(Hons) – V Semester Syllabus
Paper 6C: DATA SCIENCE 60hrs (3hrs/week)

Time:3Hours   **Max.Marks:75**

Course Objective:

The objective of the data scientist is to **explore, sort and analyze megadata from various sources** in order to take advantage of them and reach conclusions to optimize business processes or for decision support.

Course Outcomes:

On Completion of the course, the students will be able to:

CO-1. Develop relevant programming abilities.

CO-2. Demonstrate proficiency with statistical analysis of data.

CO-3. Develop the ability to build and assess data-based models.

CO-4. Demonstrate skill in data management

CO-5. Apply data science concepts and methods to solve problems in real-world contextsand will communicate these solutions effectively

UNIT - I (12 hours)

Introduction: The Ascendance of Data, What is Data Science? , Finding key Connectors, Data Scientists You May Know, Salaries and Experience, Paid Accounts, Topics of Interest, Onward.

Python: Getting Python, The Zen of Python, Whitespace Formatting, Modules, Arithmetic, Functions, Strings, Exceptions, Lists, Tuples, Dictionaries, Sets, Control Flow, Truthiness, Sorting, List Comprehensions, Generators and Iterators, Randomness, Object – Orienting Programming, Functional Tools, enumerate, zip and Argument Unpacking, args and kwargs, Welcome to Data Sciencester!

Visualizing Data: matplotlib, Bar charts, Line charts, Scatterplots.

Linear Algebra: Vectors, Matrices

UNIT – II (12 hours)

Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, some Other Correlation Caveats, Correlation and Causation.

Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem.

Hypothesis and Inference: Statistical Hypothesis Testing, Example: Flipping a Coin, Confidence Intervals, P-hacking, Example: Running an A/B Test, Bayesian Inference.

Gradient Descent: The Idea behind Gradient Descent, Estimating the Gradient, Using the Gradient, Choosing the Right Step Size, Putting It All Together, Stochastic Gradient Descent.

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UNIT – III (12 hours)

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Getting Data: stdin and stdout, Reading Files – The Basics of Text Files, Delimited Files, Scraping the Web - HTML and the parsing Thereof, Example: O'Reilly Books About Data, Using APIs – JSON (and XML), Using an Unauthenticated API, Finding APIs.

Working with Data: Exploring Your Data, Exploring One-Dimensional Data, Two Dimensions Many Dimensions, Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction.

Machine Learning: Modeling, What Is Machine Learning? Over fitting and under fitting, Correctness, The Bias-Variance Trade-off, Feature Extraction and Selection

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UNIT – IV (12 hours)

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K-Nearest Neighbors: The Model, Example: Favorite Languages, The Curse of Dimensionality.

Naive Bayes: A Really Dumb Spam Filter, A More Sophisticated Spam Filter, Implementation, Testing Our Model.

Simple Linear Regression: The Model, Using Gradient Descent, Maximum Likelihood Estimation.

Multiple Regression: The Model, Further Assumptions of the Least Squares Model, Fitting the Model, Interpreting the Model, Goodness of Fit.

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UNIT – V (12 hours)

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Logistic Regression: The Problem, The Logistic Function, Applying the Model, Goodness of Fit Support Vector Machines.

Decision Trees: What Is a Decision Tree? Entropy, The Entropy of a Partition, Creating a Decision Tree, Putting It All Together, Random Forests.

Neural Networks: Perceptron, Feed-Forward Neural Networks And Back propagation, Example: Defeating a CAPTCHA.

Clustering: The Idea, The Model, Example: Meetups , Choosing k, Example: Clustering Colors, Bottom-up Hierarchical Clustering.

TEXT BOOKS:

1. Data Science from Scratch by Joel Grus O'Reilly Media
2. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly, 2nd Edition, 2018.
3. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly, 2017.
4. Web resources:
   a. https://www.edx.org/course/analyzing-data-with-python
   b. http://math.ecnu.edu.cn/~lfzhou/seminar/[Joel_Grus]_Data_Science_from_S cr atch_First_Princ.pdf
5. Other web sources suggested by the teacher concerned and the college librarian including reading material.

Co-Curricular Activities:

a) **Mandatory:** *(Training of students by teacher in field related skills: (lab:10 + field: 05):*

1. **For Teacher**: Field related training of students by the teacher in laboratory/field for not

less than 15 hours on identifying, analyzing and presenting the data and then to predict the future instances.

2. **For Student**: Students shall (individually) search online and visit any of the agencies like Statistical cell, weather forecasting centers, pollution control boards, manufacturing industries, agriculture departments, etc. to observe the manual process going on to collect the data, maintain the data, present the data and to predict the data for future instances and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages.

3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Projectwork Report: 05.

4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, details of place visited, observations, findings andacknowledgements*.

5. Unit tests (IE).

b) Suggested Co-Curricular Activities

- Training of students by related industrial experts.
- Assignments
- Seminars, Group discussions, Quiz, Debates etc. (on related topics).
- Presentation by students in related topics

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IV B. Sc.(Hons) – V Semester
Paper 6C: DATA SCIENCE lab 30hrs (3hrs/week)

**Time:2Hours**   **Max.Marks:50**

Objecives:

- Implement simple programs in Python
- Implement programs related to various data structures like lists, dictionaries, etc.
- Implement programs related to files.
- Implement applications related to databases, Web services and IOT.

List of Programs:

1. Write a Python program to create a line chart for values of year and GDP as givenbelow
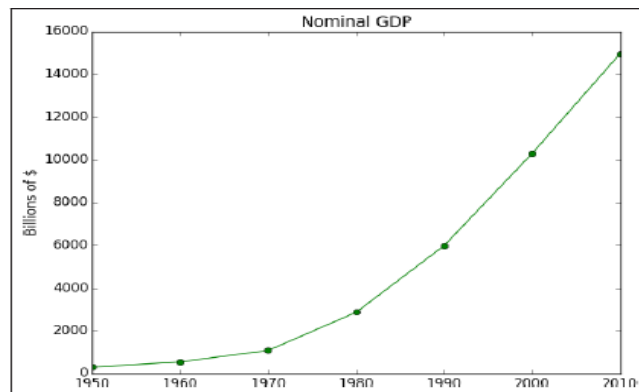
2. Write a Python program to create a bar chart to display number of students secureddifferent grading as given below

Distribution of Exam 1 Grades
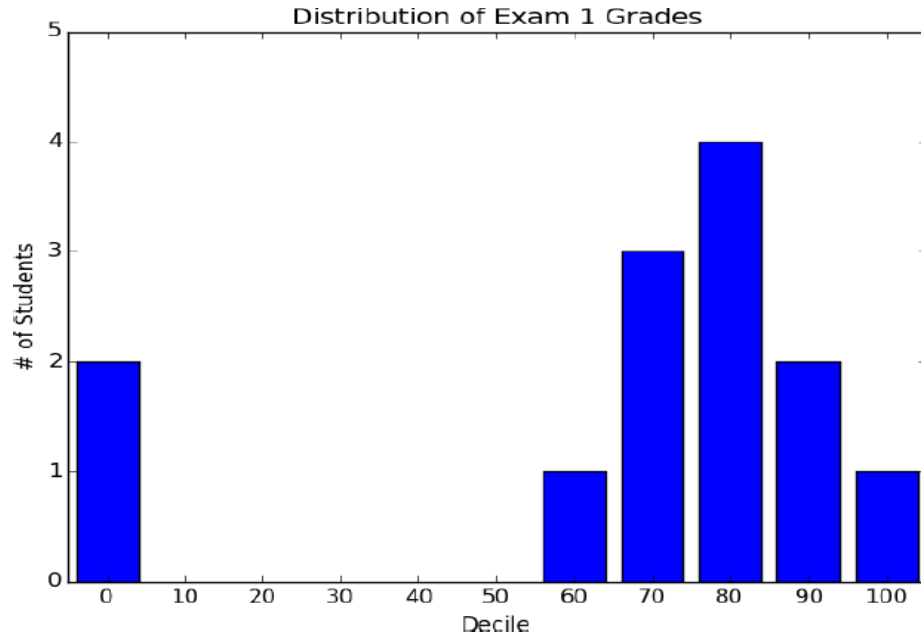
3. Write a Python program to create a time series chart by taking one year month wisestock data in a CSV file
4. Write a Python program to plot distribution curve
5. Import a CSV file and perform various Statistical and Comparison operations on rows/columns. Write a python program to plot a graph of people with pulse rate p vs.height h. The values of P and H are to be entered by the user.
6. Import rainfall data of some location with the help of packages available in R Studioand plot a chart of your choice.

Lab Evaluation Procedure

1.Record:	10 Marks
2.ProcedurecumExecution:	30 Marks
3.Viva:	10 Marks
Total	50 Marks

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IV B. Sc.(Hons) – V Semester Syllabus

Paper 7C: Python for Data Science 60hrs (3hrs/week)

Time:3Hours   **Max.Marks:75**

Course Objective:

Python is a preferred language by most data scientists and also by beginners learning data science. Some of the reasons for people being attracted towards Python for data science applications.

Course Outcomes:

On Completion of the course, the students will be able to:

CO-1. Identify the need for data science and solve basic problems using Python built-in data types and their methods.

CO-2. Design an application with user-defined modules and packages using OOP concept

CO-3. Employ efficient storage and data operations using NumPy arrays.

CO-4. Apply powerful data manipulations using Pandas.

CO-5. Do data pre-processing and visualization using Pandas

UNIT - I (12 hours)

Introduction to Data Science - Why Python? - Essential Python libraries - Python Introduction- Features, Identifiers, Reserved words, Indentation, Comments, Built-in Data types and their Methods: Strings, List, Tuples, Dictionary, Set - Type Conversion- Operators. Decision Making- Looping- Loop Control statement- Math and Random number functions. User defined functions - function arguments & its types.

UNIT – II (12 hours)

User defined Modules and Packages in Python- Files: File manipulations, File and Directory related methods - Python Exception Handling.

OOPs Concepts -Class and Objects, Constructors – Data hiding- Data Abstraction- Inheritance.

UNIT – III (12 hours)

NumPy Basics: Arrays and Vectorized Computation- The NumPy ndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing - Boolean Indexing-Transposing Arrays and Swapping Axes.

Universal Functions: Fast Element-Wise Array Functions- Mathematical and Statistical Methods-Sorting- Unique and Other Set Logic.

UNIT – IV (12 hours)

Introduction to pandas Data Structures: Series, Data Frame and Essential Functionality: Dropping Entries- Indexing, Selection, and Filtering- Function Application and Mapping- Sorting and Ranking.

Summarizing and Computing Descriptive Statistics- Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format.

Data Cleaning and Preparation: Handling Missing Data - Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers- String Manipulation: Vectorized String Functions in pandas.
Plotting with pandas: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.

TEXT BOOKS:

1. Y. Daniel Liang, "Introduction to Programming using Python", Pearson, 2012.
2. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly, 2nd Edition, 2018.
3. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly, 2017.
4. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2006.
5. Mark Lutz, "Learning Python", O'Reilly, 4th Edition, 2009.
6. Web resources:
   a. https://www.edx.org/course/python-basics-for-data-science
   b. https://www.edx.org/course/analyzing-data-with-python
   c. https://www.coursera.org/learn/python-plotting?specialization=data-science-python
   d. https://www.programmer-books.com/introducing-data-science-pdf/
   e. https://www.cs.uky.edu/~keen/115/Haltermanpythonbook.pdf
7. Other web sources suggested by the teacher concerned and the college librarianincluding reading material.

Co-Curricular Activities:

a) **Mandatory:** *(Training of students by teacher in field related skills: (lab:10 + field: 05):*

1. **For Teacher**: Field related training of students by the teacher in laboratory/field for not less than 15 hours on collecting the data, analyzing the data and presenting the data using Python language with some real time data.

2. **For Student**: Students shall (individually) visit any of the agencies like Agriculture dept, statistical cell, irrigation department, Ground water department, CPO office, Rural Water Supply and Sanitation department etc or search online to get real time data like Aids database, weather forecasting database, social networking data, etc and identify any one database, implement and present the necessary charts in Python language and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. Example: Identifying a database, get the data, present the data in required charts and to predict the future instances if possible.

3. Max marks for Fieldwork/Project work/Project work/Project work/Project work Report:05.

4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work:
Title page, student details, index page, and details of place visited, observations, method of data collection, database identified, and implementation in Python language, other findingsand acknowledgements.

5. Unit tests (IE).

Suggested Co-Curricular Activities

- 1Training of students by related industrial experts.
- Assignments
- Seminars, Group discussions, Quiz, Debates etc. (on related topics).
- Presentation by students on the topics within and outside the syllabus.

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IV B. Sc.(Hons) – V Semester

Paper 7C: Python for Data Science lab 30hrs (3hrs/week)

Time:2Hours   **Max.Marks:50**

Objecives:

- Implement simple programs in Python.
- Implement programs related to various structures like arrays, lists, Data frames, etc.
- Implement programs related to files.
- Implement applications related to data science.

List of Programs:

1. Perform Creation, indexing, slicing, concatenation and repetition operations on Python built-in data types: Strings, List, Tuples, Dictionary, Set

2. Apply Python built-in data types: Strings, List, Tuples, Dictionary, Set and their methods to solve any given problem.

3. Handle numerical operations using math and random number functions

4. Create user-defined functions with different types of function arguments.

5. Create packages and import modules from packages.

6. Perform File manipulations- open, close, read, write, append and copy from onefile to another.

7. Write a program for Handle Exceptions using Python Built-in Exceptions

8. Write a program to implement OOP concepts like Data hiding and DataAbstraction.

9. Create NumPy arrays from Python Data Structures, Intrinsic NumPy objects andRandom Functions.

10. Manipulation of NumPy arrays- Indexing, Slicing, Reshaping, Joining and Splitting.

11. Computation on NumPy arrays using Universal Functions and Mathematicalmethods.

12. Load an image file and do crop and flip operation using NumPy Indexing.

13. Create Pandas Series and Data Frame from various inputs.

14. Import any CSV file to Pandas Data Frame and perform the following:

    (a) Visualize the first and last 10 records

    (b) Get the shape, index and column details

    (c) Select/Delete the records (rows)/columns based on conditions.

    (d) Perform ranking and sorting operations.

    (e) Do required statistical operations on the given columns.

(f) Find the count and uniqueness of the given categorical values.
(g) Rename single/multiple columns

15.   Import any CSV file to Pandas Data Frame and perform the following:
   (a) Handle missing data by detecting and dropping/ filling missing values.
   (b) Transform data using apply () and map() method.
   (c) Detect and filter outliers.
   (d) Perform Vectorized String operations on Pandas Series.
   (e) Visualize data using Line Plots, Bar Plots, Histograms, Density Plotsand Scatter
Plots.

Lab Evaluation Procedure

1. **Record:**   **10 Marks**

2. **ProcedurecumExecution:** **30 Marks**

3. **Viva:**   **10 Marks**

    Total   **50 Marks**