NISHITHA DEGREE COLLEGE
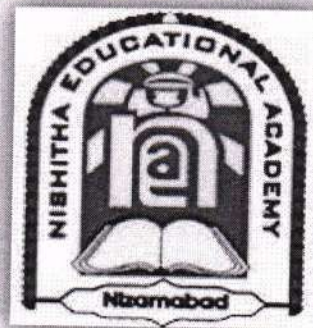## (AUTONOMOUS)
Accredited with "A "Grade by NAAC
UGC Recognized Under Section 2(f) & 12B

B.Sc Computer Science
Under CBCS System
Scheme w.e.f A.Y 2022-23

29.12.22

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Internal Examination Model Paper

Max.Marks: 30   Time Duration: 2 Hours

SECTION-A

10 Multiple Choice Questions each carries ½ Mark   10 X ½ = 5 Marks

SECTION-B

10 Fill in Blanks Questions each carries ½ Mark   10 X ½ = 5 Marks

SECTION-C

5 Short Questions each carries 1 Mark   5 X 2= 10 Marks

SECTION-D

1Perfoamance Topic either Seminar/Experiment/Activity and Attendance carries 10 Marks
                                        1 X 10=10 Marks

AECC/ SEC Model Paper

Max.Marks: 40   Time Duration: 2 Hours

SECTION-A

Answer any Two Questions. Each Carries 2 ½ Marks.   2 X 4 =8 Marks
1. From Unit 1
2. From Unit 1
3. From Unit 2
4. From Unit 2

SECTION-B

Answer any Two Questions. Each Carries 15 Marks.   2 X 16 =32 Marks
1. From Unit 1
     or
2. From Unit 1

3. From Unit 2
     or
4. From Unit 2

Time: 3 hours   'C' Language   [Max. Marks: 70]

Section - A

Answer any **SIX** Questions. All questions carry equal marks.   (6*5=30 Marks)

1. From Unit I
2. From Unit I
3. From Unit II
4. From Unit II
5. From Unit III
6. From Unit III
7. From Unit IV
8. From Unit IV
9. From Unit I (OR) III
10. From Unit II (OR) IV

Section - B

Answer ALL questions. All questions carry equal marks.   (4*10=40 Marks)

11. a) From Unit I
    (OR)
  b) From Unit I

12. a) From Unit II
    (OR)
  b) From Unit II

13. a) From Unit III
    (OR)
  b) From Unit III

14. a) From Unit IV
    (OR)
  b) From Unit IV

Code: BS106   *Course Type: DSC-3A*

Semester-I
Programming in C

Unit – I

Program Fundamentals: Generation and Classification of Programming Languages, Translators, Software Development,

Algorithms: Definitions, Different Ways of Stating Algorithms (Step-form, Pseudo-code, Flowchart), Strategy for Designing Algorithms, Structured Programming Concept.

Basics of C: Overview of C, Developing Programs in C, Parts of Simple C Program, Structure of a C Program, Loading, Linking of a Program, Developing Program, Comments, Program Statements, C Tokens, Keywords, Identifiers, Data Types, Variables, Constants, Operators and Expressions, Expression Evaluation–precedence and associativity, Type Conversions.

Unit – II

Input-Output: Non-formatted and Formatted Input and Output Functions, Escape Sequences, Control Statements: Selection Statements – if, if-else, nested if, nested if-else, comma operator, conditional operator, switch; Iterative Statements–while, for, do-while; Special Control Statement–goto, break, continue, return, exit.

Arrays and Strings: One-dimensional Arrays, Character Array, Multidimensional Arrays, Memory representation in Arrays.

Unit – III

Functions: Concept of Function, Classification of functions, Using Functions, String functions, Character functions, Mathematical functions, Call-by-Value Vs Call-by-reference, Passing Arrays to Functions, Score of Variables, Storage Classes, Inline Functions, and Recursion.

Pointers: Introduction, Address of Operator (&), Pointer, Uses of Pointers, Pointer arithmetic operations, Arrays and Pointers, Pointers and Strings, Pointers to Pointers, Array of Pointers, Pointer to Array.

Unit – IV

User-defined Data Types: Declaring a Structure (Union) and its members, Initialization Structure (Union), Accessing members of a Structure (Union), Array of Structures (Union), Structures verses Unions, Enumeration Types.

Files: Introduction, Using Files in C, File accessing modes, Working with Text Files, Working with Binary Files, Files of Records, Random Access to Files of Records, Other File Management Functions(ferror(),feof()).

Textbook: Pradip Dey, Manas Ghosh, Computer Fundamentals and Programming in C (2e)
References:
1. Ivor Horton, Beginning C
2. Ashok Kamthane, Programming in C
3. Herbert Schildt, The Complete Reference C
4. Paul Deitel, Harvey Deitel, C How to Program
5. Byron S. Gottfried, Theory and Problems of Programming with C

TELANGANA UNIVERSITY
FACULTY OF SCIENCE
B.Sc. (Computer Science)
SEMESTER – I
Programming in C Lab

Practical   3 Hours/Week   1 Credit   Marks: 25

Note:

- Programs of all the Concepts from Text Book including exercises must be practice and execute.
- Faculty must take care about UG Standard Programs.
- In the external lab examination student has to execute two programs with compilation and deployment steps are necessary. Write the Pseudo Code and draw Flow Chart for the programs.
- Recommended to use Open Source Software: GCC on Linux; DevC++ (or) CodeBlocks on Windows10.
- External Vice-Voce is compulsory.

1. Write a program to find the largest two (three) numbers using if and conditional operator.
2. Write a program to print the reverse of a given number.
3. Write a program to print the prime number from 2 to n where n is given by user.
4. Write a program to find the roots of a quadratic equation using switch statement.
5. Write a program to print a triangle of stars as follows (take number of lines from user):

```
        *
      * * *
    * * * * *
  * * * * * *
```

6. Write a program to find largest and smallest elements in a given list of numbers.
7. Write a program to find the product of two matrices.
8. Write a program to find the GCD of two numbers using iteration and recursion.
9. Write a program to illustrate the use of storage classes.
10. Write a program to demonstrate the call by value and the call by reference concepts.
11. Write a program that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
12. Write a program to illustrate use of data type enum.
13. Write a program to demonstrate use of string functions string.h header file.
14. Write a program that opens a file and counts the number of characters in a file.
15. Write a program to create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
16. Write a program that opens an existing text file and copies it to a new text file with all lowercase letters changed to capital letters and all other characters unchanged.

B.Sc. I Year I Semester (CBCS) : Data Science Syllabus
(With Mathematics Combination)
(Examination at the end of Semester - I)
Paper – I : Fundamentals of Information Technology

Objectives:
1. To deal with the basic concepts of computers.
2. To discuss about the computer hardware, its components and basic computer architecture.
3. To understand the basic computer software including the operating system and its concepts.
4. To introduce the software development process
5. To introduce the basic concept of programming

Unit-I
Data and Information: Introduction, Types of Data, Simple Model of a Computer, Data Processing Using a Computer, Desktop Computer [Reference 1]

Acquisition of Numbers and Textual Data: Introduction, Input Units, Internal Representation of Numeric Data, Representation of Characters in Computers, Error-Detecting Codes [Reference 1]

Unit-II
Data Storage: Introduction, Storage Cell, Physical Devices Used as Storage Cells, Random Access Memory, Read Only Memory, Secondary Storage, Compact Disk Read Only Memory (CDROM), Archival Store [Reference 1]

Central Processing Unit: Introduction, Structure of a Central Processing Unit, Specifications of a CPU, Interconnection of CPU with Memory and I/O Units, Embedded Processors [Reference 1]

Unit-III
Computer Networks: Introduction, Local Area Network (LAN), Applications of LAN, Wide Area Network (WAN), Internet, Naming Computers Connected to Internet, Future of Internet Technology [Reference 1]

Input Output Devices: Introduction, Keyboard, Video Display Devices, Touch Screen Display, E-Ink Display, Printers, Audio Output [Reference 1]

Computer Software: Introduction, Operating System, Programming Languages, Classification of Programming Languages, Classification of Programming Languages Based on Applications [Reference 1]

Unit-IV
The Software Problem: Cost, Schedule, and Quality, Scale and Change [Reference 2]
Software Processes: Process and Project, Component Software Processes, Software Development Process Models [Reference 2]
Programming Principles and Guidelines: Structured Programming, Information Hiding, Some Programming Practices, Coding Standards [Reference 2]

References
1. V Rajaraman. Introduction to Information Technology, 3rd Edition, PHI Learning Private Limited, 2018

2. Pankaj Jalote. Concise Introduction toSoftware Engineering, Springer, 2011

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B.Sc. I Year I Semester (CBCS) : Data Science Syllabus
(With Mathematics Combination)
(Examination at the end of Semester - I)
Practical - 1 : Fundamentals of Information Technology (Lab)

Exercises

1. Assembly and disassembly of a system box and identifying various parts inside the system box to recognize various parts of a typical computer system

2. Assembly and disassembly of peripheral devices- keyboard and mouse and study of their interface cables, connectors and ports.

3. Installation of Operating Systems-Windows and Linux

4. Disk defragmentation using system tool.

5. Procedure of disk partition and its operation (Shrinking, Extending, Delete, Format).

6. Installing and uninstalling of device drivers using control panel.

7. Working practice on windows operating system and Linux operating system: creating file, folder. Copying, moving, deleting file, folder

8. User Account creation and its feature on Windows Operating System and Changing resolution, color, appearances, and Changing System Date and Time.

9. Installation and using various wireless input devices (Keyboard/Mouse/Scanners etc.,)under Windows/Linux.

10. Study of various types of memory chips and various types of hard disk drives, partition and formatting of hard disk.

11. Installation of scanner, modem and network cards in Windows/Linux.

12. Assembly and disassembly of printer, installing a printer, taking test page, and using printer under Windows/Linux.

13. Installation of application software's – Office Automation, Anti-Virus.

14. Demonstrate the usage of Word and Power point in Windows and Linux

15. Configure Internet connection, Email Account creation, reading, writing and sending emails with attachment.

SYLLABUS FOR
BASIC COMPUTER SKILLS

OBJECTIVE:

The course is designed to impart a basic level understanding of working of a computer and its usage. After completing the course the students will be able to use the computer for basic purposes preparing to one's personnel/business letters, viewing information on Internet (the web), sending mails, using Internet banking services etc.

UNIT-1

Knowing computer: Basic Applications of Computer; Components of Computer System, Central Processing Unit (CPU), VDU, Keyboard and Mouse, Other input/output Devices, Computer Memory, Concepts of Hardware and Software; Concept of Computing, Data and Information; Connecting keyboard, mouse, monitor and printer to CPU, Checking Power Supply.

Operating Computer using GUI Based Operating System: Functions of Operating System; Basics of Popular Operating Systems(Linux, Windows); The User Interface: Status Bar, Using Menu and Menu-selection, Running an Application, Simple settings: Date And Time, Display Properties, Add Or Remove A Windows Component, Changing Mouse Properties, Adding and removing Printers, File and Directory Management: Viewing of File, Folders and Directories, Creating and Renaming of files and folders, Opening and closing of different Windows; Using help; Creating Short cuts, Basics of O.S Setup; Common utilities.

Understanding Word Processing: Word Processing Basics; Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document.

Unit-2

Using Spread Sheet: Basics of Spreadsheet; Manipulation of cells; Formulas and Functions; Editing of Spread Sheet, Printing of Spread Sheet.

Basics of presentation software; Creating Presentation; Preparation and Presentation of Slides; Slide Show

Introduction to Internet, WWW and Web Browsers: Basic of Computer networks; LAN, WAN; Concept of Internet; Applications of Internet; connecting to internet; ISP; Knowing the Internet; Basics of internet connectivity related troubleshooting, World Wide Web; Web Browsing software, Search Engines; Understanding URL; Domain name; IP Address; Using e-governance website, Using internet for Research.

Communications and collaboration: Basics of electronic mail; Getting an email account; Sending and receiving emails; Accessing sent emails; Using Emails; Document collaboration; Instant Messaging; Netiquettes.

Suggested Reading :

1. Introduction to Computers, Peter Norton, Mc GrawHill , 2012.
2. Using Information Technology, Brian K williams, StaceyC.Sawyer, Tata Mc GrawHill.

Web Resources :

1. https://online.stanford.edu/courses/soe-ycscs101-sp-computer-science-101
2. https://www.extension.harvard.edu/open-learning-initiative/intensive-introduction-
   computer-science

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Code: BS206   Course Type: DSC-3B

B.Sc. (Computer Science)
Semester-II
Programming in C++

Unit-I

Introduction to C++: Applications, Example Programs, Tokens, Data Types, Operators, Expressions, Control Structures, Arrays, Strings, Pointers, Searching and Sorting Arrays.Functions: Introduction, Prototype, Passing Data by Value, Reference Variables, Using Reference Variables as Parameters, Inline Functions, Default Arguments, Overloading Functions, Passing Arrays to Functions.Object Oriented Programming: Procedural and Object-Oriented Programming, Terminology, Benefits, OOP Languages, and OOP Applications.

Unit – II

Classes: Introduction, Defining an Instance of a Class, Why Have Private Members? Separating Class Specification from Implementation, Inline Member Functions, Constructors, Passing Arguments to Constructors, Destructors, Overloading Constructors, Private Member Functions, Arrays of Objects, Instance and Static Members, Friends of Classes, Member-wise Assignment, Copy Constructors, Operator Overloading, Object Conversion, Aggregation.

Unit – III

Inheritance: Introduction, Protected Members and Class Access, Base Class Access Specification, Constructors and Destructors in Base and Derived Classes, Class Hierarchies, Polymorphism-Function Overloading, Function Overriding and Virtual Member Functions, Abstract Base Classes and Pure Virtual Functions, Multiple Inheritance.
C++ Streams: Stream Classes, Unformatted I/O Operations, Formatted I/O Operations.

Unit – IV

Exceptions: Introduction, Throwing an Exception, Handling an Exception, Object-Oriented Exception Handling with Classes, Multiple Exceptions, Extracting Data from the Exception Class, Re-throwing an Exception.
Templates: Function Templates–Introduction, Function Templates with Multiple Type, Overloading with Function Templates, Class Templates – Introduction, Defining Objects of the Class Template, Class Templates and Inheritance, , Introduction to the STL.

Textbook: Tony Gaddis, Starting out with C++: from control structures through objects (7e)

References:
1. B. Lippman, C++ Primer
2. Bruce Eckel, Thinking in C++
3. K.R. Venugopal, Mastering C++
4. Herbert Schildt, C++: The Complete Reference
5. Bjarne Stroustrup, The C++ Programming Language
6. Sourav Sahay, Object Oriented Programming with C++TEXT BOOK:
7. Object Oriented Programming with C++ Sixth edition, E.Balaguruswamy.
8. A Structured Approach Using C++ By B.A.Forouzan & Rf Gilberg (Thomson Business Information India)

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B.Sc. (Computer Science)
SEMISTER –II
Programming in C++ Lab

1. Write a program to.

    a. Print the sum of digits of a given number.

    b.Check whether the given number is Armstrong or not

    c.Print the prime number from 2 to n where n is natural number given.

2. Write a program to find largest and smallest elements in a given list of numbers and sort thegiven list.

3. Write a program to read the student name, roll no, marks and display the same using class andobject.

4. Write a program to implement the dynamic memory allocation and de-allocation using new anddelete operators using class and object.

5. Write a program to find area of a rectangle, circle, and square using constructors.

6. Write a program to implement copy constructor.

7. Write a program using friend functions and friend class.

8. Write a program to implement constructors

    a. Default Constructor, Parameterized Constructor, Copy Constructor

    b.Define the constructor inside/outside of the class

    c.Implement all three constructors within a single class as well as use multiple

      Classes (individual classes)

9. Write a program to implement the following concepts using class and object

    a. Function overloading

    b.Operator overloading (unary/binary(+ and -))

10. Write a program to demonstrate single inheritance, multilevel inheritance and multipleinheritances.

11. Write a program to implement the overloaded constructors in inheritance.

12. Write a program to implement the polymorphism and the following concepts using class andobject.

    a.Virtual functions

    b.Pure virtual functions

13. Write a program to implement the virtual concepts for following concepts

    a.Constructor (not applied)

    b.Destructor (applied)

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14. Write a program to demonstrate static polymorphism using method overloading.

15. Write a program to demonstrate dynamic polymorphism using method overriding and dynamicmethod dispatch.

16. Write a program to implement the template (generic) concepts

    a.Without template class and object

    b.With template class and object

B.Sc. I Year II Semester (CBCS) : Data Science Syllabus
(With Mathematics Combination)
(Examination at the end of Semester - II)
Paper – II : Problem Solving and Python Programming

Unit-I

Introduction to Computing and Problem Solving: Fundamentals of Computing – Computing Devices – Identification of Computational Problems – Pseudo Code and Flowcharts – Instructions – Algorithms – Building Blocks of Algorithms.

Introduction to Python Programming: Python Interpreter and Interactive Mode– Variables and Identifiers – Arithmetic Operators – Values and Types – Statements, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: The if, The if…else, The if…elif…else Decision Control Statements, Nested if Statement, The while Loop, The for Loop, The continue and break Statements.

Unit-II

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Unit-III

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations andmethods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

Files and exception: text files, reading and writing files, format operator; command line arguments,errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

Unit-IV

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance The Polymorphism.

Functional Programming: Lambda. Iterators, Generators, List Comprehensions.

References:

1. Introduction to Python Programming. Gowrishankar S., Veena A. CRC Press, Taylor & Francis Group, 2019

2. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition,Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think- python/)

Suggested Reading:

1. Learning To Program With Python. Richard L. Halterman. Copyright © 2011
2. Python for Everybody, Exploring Data Using Python 3. Dr. Charles R. Severance. 2016

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Practical - 2 : Problem Solving and Python Programming (Lab)

Exercises

I. Programs to demonstrate the usage of operators and conditional statements

1. Write a program that takes two integers as command line arguments and prints the sum of two integers.

2. Program to display the information:
Your name, Full Address, Mobile Number, College Name, Course Subjects

3. Program to find the largest number among 'n' given numbers.

4. Program that reads the URL of a website as input and displays contents of a webpage.

II. Programs to demonstrate usage of control structures

5. Program to find the sum of all prime numbers between 1 and 1000.

6. Program that reads set of integers and displays first and second largest numbers.

7. Program to print the sum of first 'n' natural numbers.

8. Program to find the product of two matrices.

9. Program to find the roots of a quadratic equation

III. Programs to demonstrate the usage of Functions and Recursion

10. Write both recursive and non-recursive functions for the following:
a. To find GCD of two integers

b. To find the factorial of positive integer

c. To print Fibonacci Sequence up to given number 'n'

d. To convert decimal number to Binary equivalent

11. Program with a function that accepts two arguments: a list and a number 'n'. It should display all the numbers in the list that are greater than the given number 'n'.

12. Program with a function to find how many numbers are divisible by 2, 3,4,5,6 and 7 between 1 to 1000

IV. Programs to demonstrate the usage of String functions

13. Program that accept a string as an argument and return the number of vowels and consonants the string contains.

14. Program that accepts two strings S1, S2, and finds whether they are equal are not.

15. Program to count the number of occurrences of characters in a given string.

16. Program to find whether a given string is palindrome or not

V. Programs to demonstrate the usage of lists, sets, dictionaries, tuples and files.

17. Program with a function that takes two lists L1 and L2 containing integer numbers as parameters. The return value is a single list containing the pair wise sums of the numbers in L1 and L2.

18. Program to read the lists of numbers as L1, print the lists in reverse order without using reverse function.

19. Program to find mean, median, mode for the given set of numbers in a list.

20. Program to find all duplicates in the list.

21. Program to o find all the unique elements of a list.

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22. Program to find max and min of a given tuple of integers.

23. Program to find union, intersection, difference, symmetric difference of given two sets.

24. Program to display a list of all unique words in a text file

25. Program to read the content of a text file and display it on the screen line wise with a line number followed by a colon

26. Program to analyze the two text files using set operations

27. Write a program to print each line of a file in reverse order.

VI. Programs to demonstrate the usage of Object Oriented Programming

28. Program to implement the inheritance

29. Program to implement the polymorphism

VII. Programs to search and sort the numbers

30. Programs to implement Linear search and Binary search

31. Programs to implement Selection sort, Insertion sort

B.COM (Computer Applications) II semester

PROGRAMMING WITH C & C++

UNIT-I: INTRODUCTION TO C LANGUAGE, VARIABLES, DATA TYPES AND OPERATORS

Introduction: Types of Languages- History of C language – Basic Structure –Programming Rules –Flow charts-algorithms–Commonly used library functions - Executing the C Program - Pre-processors in"C"- Keywords & Identifiers – Constants – **Variables:** Rules for defining variables - Scope and Life of aVariable— **Data types** - Type Conversion - Formatted Input and Output operations. **Operators:**Introduction – Arithmetic – Relational – Logical – Assignment - Conditional - Special - Bitwise -Increment / Decrement operator.

UNIT-II: WORKING WITH CONTROL STATEMENTS, LOOPS

Conditional statements: Introduction - If statements - If-else statements – nested if-else – breakstatement-continue statement-go to statement-Switch statements. **Looping statements:** Introduction-While statements – Do-while statements - For Statements-nested loop statements.

UNIT-III: FUNCTIONS, ARRAYS AND STRINGS

Functions: Definition and declaration of functions- Function proto type-return statement- types offunctions-formatted and unformatted functions. **Built in functions:** Mathematical functions - Stringfunctions - Character functions - Date functions.**User defined functions:** Introduction - Need for userdefined functions - Elements of functions – Function call – call by value and call by reference – Recursive functions.**Arrays:** Introduction - Defining an array - Initializing an array –characteristics of an array- Onedimensional array – Two dimensional array – Multi dimensional array. **Strings:** Introduction - Declaringand initializing string - Reading and Writing strings - String standard functions.

UNIT-IV: POINTERS, STRUCTURES AND UNIONS

Pointers: Features of pointers- Declaration of Pointers-arithmetic operations with pointers **Structures:** Features of Structures - Declaring and initialization of Structures –Structure within Structure-Array of Structures-Enumerated data type-**Unions**-Definition and advantages of Unions comparisonbetween Structure & Unions.

UNIT-V: OBJECT ORIENTED CONCEPTS USING C++

Object Oriented Programming: Introduction to Object Oriented Programming - Structure of C++ –Simple programof C++– Storage Classes-Similarities and Differences between C & C++ - DataMembers-Member Functions - Object Oriented Concepts-Class-Object-Inheritance-Polymorphism-Encapsulation-Abstraction.

SUGGESTED READINGS:

1. Programming with C& C++ :IndrakantiSekhar, V.V.R.Raman&V.N.Battu, Himalaya Publishers.
2. Programming in ANSI C: Balagurusamy, McGraw Hill.
3. Mastering C: K.R. Venugopal, McGraw Hill.
4. C: The Complete Reference: H.Schildt, McGraw Hill.
5. Let Us C: Y.Kanetkar, BPB.
6. Objected Oriented Programming with C++: E. Balagurusamy, McGraw Hill.
7. Mastering C++: KR.Venugopal&R.Buyya, McGraw Hill.
8. Schaum s Outlines: Programming with C++: by John R Hubbard.
9. Let Us C++: Y.Kanetkar, BPB.

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PROGRAMMING WITH C & C++ LAB

1.Write a C Program to Add Two Integers.

2. Write a C Program to Print an Integer (Entered by the User).

3. Write a C Program to Multiply Two Floating-Point Numbers.

4. Write a C Program to Find ASCII Value of a Character.

5. Write a C Program to Compute Quotient and Remainder.

6. Write a C Program to Find the Size of int, float, double and char.

7. Write a C Program to Swap Two Numbers Using Temporary Variable.

8. Write a C Program to Check Whether a Number is Even or Odd

9. Write a C Program to Check Odd or Even Using the Ternary Operator.

10. Write a C Program to Check Whether a Character is a Vowel or Consonant.

11. Write a C Program to Find the Largest Number Among Three Numbers.

12. Write a C Program to Check Leap Year.

13. Write a C Program to Check Whether a Character is an Alphabet or not.

14. Write a C Program to Calculate the Sum of first 'N' Natural Numbers.

15. Write a C Program to Find Factorial of a Number.

16. Write a C Program to Generate Multiplication Table of a given number.

17. Write a C Program to Display Fibonacci Sequence up to 'n' numbers.

18. Write a C Program to Count Number of Digits in an Integer.

19. Write a C Program to Reverse a Number.

20. Write a C Program to Check Whether a Number is Palindrome or Not.

21. Write a C Program to Check Whether a Number is Prime or Not.

22. Write a C Program to Check whether the given number is an Armstrong Number or not.

23. Write a C Program to Make a Simple Calculator Using switch...case.

24. Write a C Programming Code To Create Pyramid and Pattern.

25. Write a C program to reverse a Sentence Using Recursion.

26. Write a C Program to Display Prime Numbers Between Intervals Using Function.

27. Write a C Program to Convert Binary Number to Decimal and vice-versa.

28. Write a C Program to Check Prime or Armstrong Number Using User-defined Function.

29. Write a C program to calculate the power using recursion.

30. Write a C Program to Find G.C.D Using Recursion.

31. Write a C Program to Calculate Average Using Arrays

32. Write a C Program to Find Largest Element in an Array

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Page 28

33. Write a C Program to Add Two Matrices Using Multi-dimensional Arrays.

34. Write a C Program to Find the Length of a String.

35. Write a C Program to Concatenate Two Strings.

36. Write a C Program to Copy String Without Using strcpy().

37. Write a C Program to Count the Number of Vowels, Consonants and so on.

38. Write a C Program to Find the Frequency of Characters in a String.

39. Write a C Program to Access Array Elements Using Pointers.

40. Write a C program to create, initialize, assign and access a pointer variable.

41. Write a C program to swap two numbers using pointers

42. Write a C program to count vowels and consonants in a string using pointers.

43. Write a C Program to Store Information of a Student Using Structure.

44. Write a C Program to Add Two Distances (in inch-feet system) using Structures.

45. Write a C Program to Store Information of Students Using Structure.

46. Write a C program to declare, initialize an union.

47. Write a C++ program to implement function overloading.

48. Write a C++ program to calculate an area of rectangle using encapsulation.

49. Write a C++ program to add two numbers using data abstraction.

50. Write a C++ program to overload binary operators

Structure of the B.Sc (MPCs/MSCs/MECs)

Semester III and IV

Semester	Code	Course Category	Title of the Paper	No. of Credits	No. Hrs PW	Max.Marks			Total Marks
						Internal Exam	External Exam	Practical Lab	
III	BS304	SEC-2	Python-1	2	2	10	40	-	50
	BS307	DSC-3C	Data Structures using C++	4+1	4+3	30	70	50	150
IV	BS404	SEC-4	Python-2	2	2	10	40		50
	BS407	DSC-3D	Data Base Management Systems (DBMS)	4+1	4+3	30	70	50	150

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B.Sc.(ComputerScience)
SEMESTER–III
Data Structures using C++

Unit-I
Basic data Structure: Introduction to Data Structures, Types of Data Structures, Algorithm, Characteristics of Algorithm, Pseudo code, Relationship among data, data structures, and algorithms, Implementation of data structures, Analysis of Algorithms.

Stacks: Concept of Stacks, Stack Abstract Data Type, Representation of Stacks Using Sequential Organization (Arrays), Multiple Stacks, Applications of Stack, Expression Evaluation and Conversion, Polishnotation and expression conversion, Processing of Function Calls, Reversing a String with a Stack.

Unit -II
Queues: Concept of Queues, Queue as Abstract Data Type, Representation of Queues Using Arrays, Circular Queue, Multi-queues, Dequeue, Priority Queue, Applications of Queues.

Linked Lists: Introduction, Linked List Operations, Linked List Abstract Data Type, Linked List Variants, Doubly Linked List, Circular Linked List, Stack using linked list and Queue using linked list.

Unit-III
Trees: Introduction, Types of Trees, Binary Tree, Binary Tree Abstract Data Type, Representation of a Binary Tree, Insertion of a Node in Binary Tree, Binary Tree Traversal, Other Tree Operations, Binary Search Tree, Applications of Binary Trees.

Searching and Sorting: Search Techniques-Linear Search, Binary Search, Analysis of search techniques, Sorting Techniques-Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Quick Sort, Comparison of Sorting Methods,

Unit –IV
Hashing: Introduction, Key Terms and Issues, Hash Functions, Collision Resolution Strategies, Hash Table Over flow, Extendible Hashing

Graphs: Introduction, Representation of Graphs, Graph Traversal–Depth First Search, Breadth First Search, Spanning Tree, Prim's Algorithm, Kruskal's Algorithm.

Textbooks:
1. Varsha H. Patil "Data structures using C++"Oxford Universitypress,2012
2. M.T.Goodrich, R.Tamassia and D.Mount, Data Structures and Algorithms in C++, John Wiley and Sons,Inc.,2011.

References:
1. Adam Drozdek "Data structures and algorithm in C++"Secondedition,2001
2. T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, Introduction to Algorithms, 2ndEd., Prentice-Hall of India,2006.
3. Robert L. Kruse and A.J. Ryba, Data Structures and Program Design in C++, Prentice Hall,Inc.,NJ,1998.
4. B.Stroupstrup, The C++ Programming Language, Addison Wesley,2004
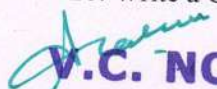5. D.E.Knuth, Fundamental Algorithms (Vol.I), Addison Wesley, 1997

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FACULTY OFSCIENCE
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SEMESTER–III
Data Structures using C++Lab

Note:

- Programs of all the Concepts from Text Book including exercises must be practice and execute.
- In the external lab examination student has to execute two programs with compilation and deployment steps are necessary.
- External Vice-Voce is compulsory.

1. Write a C++ program to implement the Stack ADT using an array

2. Write a C++ program to implement the Queue ADT using an array

3. Write a C++ program to implement Circular queue using an array.

4. Write a C++ program to implement the Stack ADT using a single linked list.

5. Write a C++ program to implement the Queue ADT using a single linked list

6. Write C++ program to perform the following operations:

      a) Insert an element into a binary search tree.

      b) Delete an element from a binary search tree.

      c) Search for a key in a binary search tree.

7. Write a C++ program for the implementation tree traversal technique

8. Write a C++ program that uses recursive functions to traverse a binary search tree.

      a) Pre-order   b)In-order   c)Post-order

9. Write a C++ program to find height of a tree.

10. Write a C++ program to find MIN and MAX element of a BST

11 Write a C++ program for Linear Search

12. Write a C++ Program for Binary Search

13. Write a C++ program for Quick sort

14. Write a C++ program for Merge sort

15. Write a C++ program for bubble sort

16. Write a C++ program for selection sort

17. Write a C++ program for insertion sort

18. Write a C++ program to implement Hash Table

19. Write a C++ program to implement BFS graph traversal technique

20. Write a C++ program to implement DFS graph traversal technique

Unit-I

Introduction: Purpose of Database Systems, Components of DBMS, advantages and disadvantages of DBMS, Applications of DBMS, Data Abstraction, Database Languages, , Database Design, Data Storage, Data Models. Database Architecture, Database Users and Administrators.

Introduction to the Relational Model: Structure of Relational Databases, Database Schema, Keys, Relational Algebra, Relational Calculus

Unit -II

Database Design and the E-RModel: Overview of the Design Process, Entity Sets, Relationship Sets, Constraints, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues,Extended E-R Features,

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Functional-Dependency, Decomposition Using Functional Dependencies, ,Decomposition Using Multivalued Dependencies.
Normal Forms-2NF,3NF,BCNF.

Unit-III

Introduction to SQL: Overview of the SQL , SQL Data Types and Schemas, , Basic Structure of SQL Queries, DDL, DML, TCL, DCL commands, Null Values, Additional Basic Operations: Set Operations, Aggregate Functions, Nested queries, , .
Intermediate SQL: Join Expressions, Views, Integrity Constraints, Authorization.

PL/SQL: Accessing SQL from a Programming Language, Functions and Procedures, Cursors, Triggers.

Unit -IV

Transaction Management: Transaction Support–Properties of Transactions,
Concurrency Control–The Need for Concurrency Control, Serializability and Recoverability, Locking Methods, Deadlock, Time Stamping Methods,
Database Recovery–The Need for Recovery, Transactions and Recovery, Recovery Facilities, Recovery Techniques,

Security: Database Security–Threats, Computer-Based Controls–Authorization, Access Controls, Views, Backup and Recovery, Integrity, Encryption, RAID.

Textbook:

1. Silberschatz, H.Korthand S.Sudarshan, Database System Concepts, 6thEd., Tata McGraw Hill, 2011
2. Thomas M.Connolly, Carolyn E.Begg, Database Systems–A Practical Approach to Design, Implementation, and Management(6e)

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FACULTY OFSCIENCE
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SEMESTER–IV
Data Base Management Systems Lab

Note:

- Programsofalltheconcepts fromTextBookincluding exercisesmustbepracticeandexecute.
- Intheexternallab examinationstudenthas toexecutetwoprograms withcompilationanddeploymentstepsarenecessary.
- ExternalVice-Voceiscompulsory.

1. Create a database having two tables with the specified fields, to computerize a library system of a University College.
   Library Books (Accession number, Title, Author, Department, Purchase Date, Price)
   Issued Books (Accession number, Borrower)

   a) Identify primary and foreign keys.Create the tables and insert atleast 5 records in each table.
   b) Delete the record of book titled "Database System Concepts".
   c) Change the Department of the book titled "Discrete Maths"to"CS".
   d) List all books that belong to"CS"department.
   e) List all books that belong to"CS"department and are written by author "Navathe".
   f) List all computer (Department="CS") that have been issued.
   g) List all books which have a price less than 500 or purchased between "01/01/1999" and "01/01/2004".

2. Createa database having three tables to store the details of students of Computer Department in your college.
   Personal information about Student (College roll number, Name of student, Date ofbirth, Address, Marks (rounded off to whole number) in percentage at 10 + 2, Phonenumber)
   Paper Details (Papercode,NameofthePaper)
   Student'sAcademic and Attendance details (College roll number, PaperCode, Attendance, Marks in home examination).

   a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
   b) Design a query that will return the records (from the second table) along with the name of student from the first table, related to students who have more than 75% attendanc and more than 60% marks in paper2.
   c) List all students who live in "Warangal"and have marks greater than 60 in paper1.
   d) Find the total attendance and total marks obtained by each student.
   e) List the name of student who has got the highest marks in paper2.

3. Create the following tables and answer the queries given below:

Customer (CustID, email, Name, Phone, ReferrerID)
Bicycle (BicycleID, DatePurchased, Color, CustID, ModelNo)
BicycleModel (ModelNo, Manufacturer, Style)
Service (StartDate, BicycleID, EndDate)

a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
b) List all the customers who have the bicycles manufactured by manufacturer "Honda".
c) List the bicycles purchased by the customers who have been referred by Customer "C1".
d) List the manufacturer of red colored bicycles.
e) List the models of the bicycles given for service.

4. Create the following tables, enter at least 5 records in each table and answer the queries given below.
Employee (Person_Name, Street, City)
Works (Person_Name, Company_Name, Salary)
Company (Company_Name, City)
Manages (Person_Name, Manager_Name)

a) Identify primary and foreign keys.
b) Alter table employee, add a column "email" of type varchar(20).
c) Find the name of all managers who work for both Samba Bank and NCB Bank.
d) Find the names, street address and cities of residence and salary of all employees who work for "Samba Bank" and earn more than $10,000.
e) Find the names of all employees who live in the same city as the company for which they work.
f) Find the highest salary, lowest salary and average salary paid by each company.
g) Find the sum of salary and number of employees in each company.
h) Find the name of the company that pays highest salary.

5. Create the following tables, enter atleast 5 records in each table and answer the queries given below.
Suppliers (SNo, Sname, Status, SCity)
Parts (PNo, Pname, Colour, Weight, City)
Project (JNo, Jname, Jcity)
Shipment (Sno, Pno, Jno, Qunatity)

a) Identify primary and foreign keys.
b) Get supplier numbers for suppliers in Paris with status>20.
c) Get suppliers details for suppliers who supply part P2. Display the supplier list in increasing order of supplier numbers.
d) Get suppliers names for suppliers who do not supply part P2.

e) For each shipment get full shipment details, including total shipment weights.
f) Get all the shipments where the quantity is in the range 300 to 750 inclusive.
g) Get part nos. for parts that either weigh more than 16 pounds or are supplied by suppliers S2, or both.
h) Get the names of cities that store more than five red parts.
i) Get full details of parts supplied by a supplier in Hyderabad.

6. Write a PL/SQL Program to demonstrate Procedure.

7. Write a PL/SQL Program to demonstrate Function.

8. Write a PL/SQL program to Handle Exception.

9. Write a PL/SQL Program to perform a set of DML Operations.

10. Create a View using PL/SQL program.

11. Write a PL/SQL Program on Statement Level Trigger.

12. Write a PL/SQL Program on Row Level Trigger.

13. Write a PL/SQL Program for Cursors

B.Sc. (Computer Science)

SEMESTER – III

Python – I

(SEC – II)

Unit – I

Introduction to Python Programming: How a Program Works, Using Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations (Operators. Type conversions, Expressions), More about Data Output. Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops
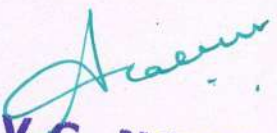
Unit – II

Functions: Introduction, Defining and Calling a Void Function, Designing a Program to Use Functions, Local Variables, Passing Arguments to Functions, Global Variables and Global Constants, Value-Returning Functions- Generating Random Numbers, Writing Our Own Value-Returning Functions, The math Module, Storing Functions in Modules. File and Exceptions: Introduction to File Input and Output, Using Loops to Process Files, Processing Records, Exceptions.

Text Book:

Tony Gaddis, Starting Out With Python (3e)

References:

1. Kenneth A. Lambert, Fundamentals of Python
2. Clinton W. Brownley, Foundations for Analytics with Python
3. James Payne, Beginning Python using Python 2.6 and Python 3
4. Charles Dierach, Introduction to Computer Science using Python
5. Paul Gries, Practical Programming: An Introduction to Computer Science using Python 3

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B.Sc. (Computer Science)

SEMESTER – IV

Python – II

(SEC – IV)

Unit – I

Lists and Tuples: Sequences, Introduction to Lists, List slicing, Finding Items in Lists with the in Operator, List Methods and Useful Built-in Functions, Copying Lists, Processing Lists, Two- Dimensional Lists, Tuples. Strings: Basic String Operations, String Slicing, Testing, Searching, and Manipulating Strings. Dictionaries and Sets: Dictionaries, Sets, Serializing Objects.
Recursion: Introduction, Problem Solving with Recursion, Examples of Recursive Algorithms.

Unit – II

Object-Oriented Programming: Procedural and Object-Oriented Programming, Classes, Working with Instances, Techniques for Designing Classes, Inheritance, Polymorphism.
GUI Programming: Graphical User Interfaces, Using the tkinter Module, Display text with Label Widgets, Organizing Widgets with Frames, Button Widgets and Info Dialog Boxes, Getting Input with Entry Widget, Using Labels as Output Fields, Radio Buttons, Check Buttons.

Text Book:

Tony Gaddis, Starting Out With Python (3e)

References:

1. Kenneth A. Lambert, Fundamentals of Python
2. Clinton W. Brownley, Foundations for Analytics with Python
3. James Payne, Beginning Python using Python 2.6 and Python 3
4. Charles Dierach, Introduction to Computer Science using Python
5. Paul Gries, Practical Programming: An Introduction to Computer Science using Python 3

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Structure of the B.Sc (MSDs)

Semester III and IV

Semester	Code	Course Category	Title of the Paper	No. of Credits	No. Hrs PW	Max.Marks			Total Marks
						Internal Exam	External Exam	Practical Lab	
III	BS307	DSC-3C	Data Engineering with Python	4+1	4+3	30	70	50	150
IV	BS407	DSC-4D	Machine Learning	4+1	4+3	30	70	50	150
	BS404	SEC - 4	Mini Project	2	2	10	40		50

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B.Sc. II Year III Semester (CBCS): Data Science Syllabus
(With Mathematics Combination)
Paper – III: Data Engineering with Python

Objective: The main objective of this course is to teach how to extract raw data, clean the data, perform transformations on data, load data and visualize the data

Outcomes:

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

- Handle different types of files and work with text data
- Use regular expression operations
- Use relational databases via SQL
- Use tabular numeric data
- Use the data structures: data series and frames
- Use PyPlot for visualization

Unit – I

Data Science: Data Analysis Sequence, Data Acquisition Pipeline, Report Structure [Reference 1(Chapter 1-Unit1 to Unit 3)]]

Files and Working with Text Data: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os .path Modules. [Reference 2, Chapter 9)]**Working with Text Data:** JSON and XML in Python [Reference 2, Section12.2]

Unit – II

Working with Text Data: Processing HTML Files, Processing Texts in Natural Languages [Reference 1(Chapter3 –Unit 13, and Unit16)

Regular Expression Operations: Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with *glob* Module [Reference 2-Chapter 10]

Unit – III

Working with Databases: Setting Up a MySQL Database, Using a MySQL Database: Command Line, Using a MySQL Database, Taming Document Stores: Mongo DB [Reference1 (Chapter4-Unit17toUnit20)]

Working with Tabular Numeric Data(Numpy with Python): NumPy Arrays Creation Using *array()* Function, Array Attributes, NumPy Arrays Creation with Initial Placeholder Content, Integer Indexing, Array Indexing, Boolean Array Indexing, Slicing and Iterating in Arrays, Basic Arithmetic Operations on NumPy Arrays, Mathematical Functions in NumPy, Changing the Shape of an Array, Stacking and Splitting of Arrays, Broadcasting in Arrays. [Reference 2: Section 12.3)]

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Unit – IV
Working with Data Series and Frames: Pandas Data Structures, Reshaping Data, Handling Missing Data, Combining Data, Ordering and Describing Data, Transforming Data, Taming Pandas File I/O [Reference 1 (Chapter 6-Unit 31 to Unit 37)]
Plotting: Basic Plotting with PyPlot, Getting to Know Other Plot Types, Mastering Embellishments, Plotting with Pandas [Reference 1 (Chapter8-Unit 41 to Unit 44)]

References:

1. Data Science Essentials in Python: Collect, Organize, Explore, Predict, Value. Dmitry Zinoriev, The Pragmatic Programmers LLC, 2016

2. Introduction to Python Programming. Gowrishankar S., Veena A. CRC Press, Taylor & Francis Group, 2019

Suggested Reading

3. Python for Everybody: Exploring Data Using Python 3. Charles R Severance, 2016

4. Python Data Analytics – Data Analysis and Science using Pandas, matplotlib and the Python Programming Language. Fabio Nelli, Apress, 2015

5. Website Scraping with Python. Using Beautiful Soup and Scrapy. Gábor LászlóHajba ,Apress, 2018

6. Machine Learning with Python Cookbook:.Practical Solutions from Preprocessing to Deep Learning. Chris Albon, O'Reilly 2018

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B.Sc. II Year III Semester (CBCS) : Data Science Syllabus
(With Mathematics Combination)
Practical - 3 : Data Engineering with Python (Lab)

Objective:

The main objective of this laboratory is to put into practice the ETL (extract, transform, load) pipeline which will extract raw data, clean the data, perform transformations on data, load data and visualize the data.

This requires mentoring by TCS.

Libraries

In this course students are expected to extract, transform and load input data that can be text files, CSV files, XML files, JSON, HTML files, SQL databases, NoSQL databases etc.,. For doing this, they should learn the following Python libraries/modules:
Pandas, numpy, Beautiful Soup, pymysql, pymongo, nltk, matplot lib

Datasets

For this laboratory, appropriate publicly available datasets, can be studied and used.
Example:
MNIST (http://yann.lecun.com/exdb/mnist/),
UCI Machine Learning Repository(https://archive.ics.uci.edu/ml/datasets.html),
Kaggle(https://www.kaggle.com/datasets)
Twitter Data

Exercises

1. Write programs to parse text files, CSV, HTML, XML and JSON documents and extract relevant data. After retrieving data check any anomalies in the data, missing values etc.
2. Write programs for reading and writing binary files
3. Write programs for searching, splitting, and replacing strings based on pattern matching using regular expressions
4. Design a relational database for a small application and populate the database. Using SQL do the CRUD (create, read, update and delete) operations.
5. Create a Python MongoDB client using the Python module pymongo. Using a collection object practice functions for inserting, searching, removing, updating, replacing, and aggregating documents, as well as for creating indexes
6. Write programs to create numpy arrays of different shapes and from different sources, reshape and slice arrays, add array indexes, and apply arithmetic, logic, and aggregation functions to some or all array elements

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Course Objectives:

The main objective of this course is to teach the principles and foundations of machine learning algorithms

Course Outcomes:

At the end of the course the student will be able to understand Basics of Machine Learning and its limitations

- Machine Learning Algorithms: supervised, unsupervised, bio-inspired

- Probabilistic Modeling and Association Rule Mining

Unit-I Introduction: What does it mean to learn, Some canonical Learning Problems, The Decision Tree Model of Learning, Formalizing the Learning Problem [Reference 1], ID3 Algorithm [[Reference 2] Limits of Learning: Data Generating Distributions, Inductive Bias, Not everything is learnable, Under fitting and Over fitting, Separation of training and test Data, Models, parameters and Hyper parameters, Real World Applications of Machine Learning [Reference 1] Geometry and Nearest Neighbors: From Data to Feature Vectors, k-Nearest Neighbors, Decision Boundaries, k-means Clustering, High Dimensions [Reference 1]

Unit-II The Perceptron: Bio-inspired Learning, The Perceptron Algorithm, Geometric Interpretation, Interpreting Perceptron Weights, Perceptron Convergence and Linear Separability, Improved Generalization, Limitations of the Perceptron [Reference 1] Practical Issues: Importance of Good Features, Irrelevant and Redundant Features, Feature Pruning and Normalization, Combinatorial Feature Explosion, Evaluating Model Performance, Cross Validation, Hypothesis Testing and Statistical Significance, Debugging Learning Algorithms, Bias Variance trade-off [Reference 1] Linear Models: The Optimization Framework for Linear Models, Convex Surrogate Loss Functions, Weight Regularization, Optimization and Gradient Descent, Support Vector Machines [Reference 1]

Unit-III Probabilistic Modeling: Classification by Density Estimation, Statistical Estimation, Naïve Bayes Models, Prediction [Reference 1] Neural Networks: Bio-inspired Multi-Layer Networks, The Back-propagation Algorithm, Initialization and Convergence of Neural Networks, Beyond two layers, Breadth vs Depth, Basis Functions [Reference 1] TELANGANA UNIVERSITY Nishitha Commerce and Science College, Nizamabad Page 14

Unit IV Unsupervised Learning: Clustering Introduction, Similarity and Distance Measures, Agglomerative Algorithms, Divisive Clustering, Minimum Spanning Tree [Reference 2] Association Rules: Introduction, large Item sets, A priori Algorithm [Reference 2]

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References:

1. A Course in Machine Learning (CIML). Hal Daume III, 2017 (freely available online) http://ciml.info/

2. Data Mining: Introductory and Advanced Topics. Margaret H Dunham, Pearson Education, 2003

Suggested Reading:

3. Hands on Machine Learning with SciKit-Learn, Keras and Tensor Flow. AurélienGéron. O'Reily, 2019

4. Machine Learning with Python Cookbook. Chris Albo, O'Reily, 2018

5. Introduction to Machine Learning with Python: A guide. Andreas C Miller, Sarah Guido O'Reily, 2017

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B.Sc. II Year IV Semester (CBCS)

Data Science Syllabus (With Mathematics Combination)

Practical - 4: Machine Learning (Lab)

Objective: The main objective of this laboratory is to put into practice the various machine learning algorithms for data analysis using Python and Weka.

ML Toolkits Students are expected to learn

1. Scikit-learn (https://scikit-learn.org/) an open source machine learning Python library that supports supervised and unsupervised learning. It also provides various tools for model fitting, data preprocessing, model selection and evaluation, and many other utilities.

2. Weka (http://www.cs.waikato.ac.nz/ml/weka/)is another widely used ML toolkit.

Datasets

1. The sklearn.datasets package embeds small toy datasets. It includes utilities to load these datasets. It also includes methods to load and fetch popular reference datasets and features some artificial data generators. Students are expected to study and make use of these datasets

2. Weka also has provides various data sets.

References:

1. Scikit-learn user guide.https://scikit-learn.org/stable//_downloads/scikit-learn-docs.pdf

2. Ian Witten, Eibe Frank, and Mark Hall, Chris Pal.

DATA MINING: Practical Machine Learning Tools and Techniques, 4th Edition. Morgan Kaufmann. Exercises

3. Write a Python program using Scikit-learn to split the iris dataset into 70% train data and 30% test data. Out of total 150 records, the training set will contain 120 records and the test set contains 30 of those records. Print both datasets

4. Write Python program to use sklearn'sDecisionTreeClassifier to build a decision tree for the sklearn's datasets. Implement functions to find the importance of a split (entropy, information gain, gini measure)
10. Write a Python program to implement your own version of the K-means algorithm. Then apply it to different datasets and evaluate the performance.

5. Design a perceptron classifier to classify handwritten numerical digits (0-9). Implement using scikit or Weka.

6. Write a Python program to classify text as spam or not spam using the Naïve Bayes Classifier

7. Use WEKA and experiment with the following classifiers: Association Rule Mining (Apriori), Agglomerative and Divisive Clustering.

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