

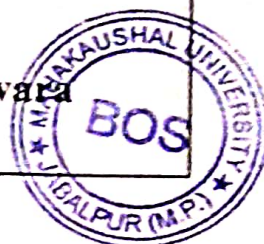
Mahakaushal University, Jabalpur (M.P.)



Scheme & Syllabus For B.Sc (Information Technology) with Research/honors Faculty of Computer Science and Applications 2022-23

Duration of Course: 4 Years
Examination Mode: Semester
Examination System: CBCS

Mahakaushal University
Village-Aithakheda, Mukunwara Road, Post-Tilwara
Jabalpur(M.P.)482003



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BBIT0101T:Programming in C

UNIT I(12Lectures)

Introduction to C: Introduction to the C programming language, its history, evolution, and importance in modern programming. Overview of C as a procedural and structured language. Structure of a C program including header files, main function, and program statements. Compilation, linking, and execution process of a C program. Constants, variables, and data types (int, float, double, char, void) with examples. Operators in C: arithmetic, relational, logical, assignment, increment/decrement, conditional, and bitwise operators. Operator precedence, associativity, and type conversion rules. Introduction to input/output using `printf` and `scanf` including format specifiers, escape sequences, and control strings.

UNIT II(10Lectures)

Control Structures: Decision-making statements in C: `if`, `if-else`, nested `if`, `switch-case` with multiple examples and use cases. Looping constructs: `for`, `while`, `do-while` including nested loops and applications in repetitive tasks. Jump statements: `break`, `continue`, `goto`, and their practical usage. Conditional (ternary) operator `?:` and short-hand decision making. Emphasis on logical thinking and program flow control. Examples including number comparisons, conditional calculations, and iterative problems.

UNIT III(12Lectures)

Functions and Recursion: Defining, declaring, and calling functions in C. Importance of modular programming and reusability. Function parameters, passing techniques: call by value and call by reference. Recursive functions: factorial, Fibonacci series, and practical recursion problems. Scope and lifetime of variables: local, global, static, and external variables. Storage classes: `auto`, `register`, `static`, and `extern` with examples. Inline functions and their usage in optimizing performance. Function prototypes, return values, and void functions.

UNIT IV(14Lectures)

Arrays, Strings, and Pointers: One-dimensional and two-dimensional arrays: declaration, initialization, traversal, searching, and sorting. Multi-dimensional arrays and their applications in matrices. String handling: string declaration, manipulation, and functions like `strcpy`, `strlen`, `strcmp`, `strcat`, `strrev`, and `strupr/strlwr`. Introduction to pointers: declaration, initialization, pointer arithmetic, pointer to array, pointer to function, and pointers with strings. Dynamic memory allocation using `malloc`, `calloc`, `realloc`, and `free`. Examples of passing arrays and pointers to functions, pointer-based string manipulation, and memory-efficient programs.

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UNIT V(12Lectures)

Structures, Unions, and File Handling: Introduction to user-defined data types using structures, nested structures, and arrays of structures. Unions and enumerations, their memory management and usage in real-time applications. File handling in C: opening and closing files using `fopen` and `fclose`, reading and writing using `fread`, `fwrite`, `fprintf`, `fscanf`, and handling text and binary files. Command line arguments for input to programs. Sorting and searching records using arrays, structures, and files. Error handling in file operations. Applications of structures and file handling in student databases, employee records, and inventory systems.

Reference Books

1. E. Balagurusamy – *Programming in ANSI C*, McGraw Hill
2. Brian W. Kernighan & Dennis M. Ritchie – *The C Programming Language*, PHI
3. Yashavant Kanetkar – *Let Us C*, BPB Publications
4. H. Schildt – *C: The Complete Reference*, McGraw Hill
5. K. N. King – *C Programming: A Modern Approach*, W. W. Norton & Company
6. Reema Thareja – *Programming in C*, Oxford University Press
7. R. Subburaj – *Programming in C*, Vikas Publishing House
8. Ashok Kamthane – *Programming in C and Data Structures*, Pearson
9. Tony Gaddis – *Starting Out with C*, Pearson
10. Alfred V. Aho & Jeffrey D. Ullman – *Data Structures and Algorithms in C*, Pearson

C Programming Lab

1. **Hello World & Basic I/O** – Display messages, input/output of numbers, characters, and strings.
2. **Arithmetic Operations** – Perform addition, subtraction, multiplication, division, and modulus operations.
3. **Largest/Smallest of Numbers** – Find the largest and smallest among three or more numbers using if-else and switch-case.
4. **Prime Number Check** – Determine whether a given number is prime or not.
5. **Fibonacci Series** – Generate Fibonacci series up to n terms using loops and recursion.
6. **Factorial Calculation** – Compute factorial of a number using loops and recursion.
7. **Swapping Numbers** – Swap two numbers using functions (call by value and call by reference).
8. **GCD & LCM Calculation** – Find Greatest Common Divisor and Least Common Multiple using functions.
9. **Arrays – Sum, Average & Max/Min** – Calculate sum, average, maximum, and minimum of array elements.
10. **Matrix Operations** – Perform addition, subtraction, and multiplication of two-dimensional arrays (matrices).
11. **String Handling** – Reverse a string, check palindrome, concatenate strings, and compare strings using built-in functions.
12. **Dynamic Memory Allocation** – Create, use, and free dynamic arrays using `malloc`, `calloc`, `realloc`, and `free`.
13. **Pointers & Pointer Arithmetic** – Demonstrate pointer declaration, arithmetic, and passing arrays to functions using pointers.

14. **Structures & Unions** – Create student or employee records using structures, nested structures, and unions; display and manipulate data.
15. **File Handling** – Read and write data to text and binary files, search and sort records, and implement simple menu-driven database using files.

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BBIT0102T: PC Packages (Windows, MS Word, MS Excel, Ms Power Point)

UNIT-I

MS Windows: Introduction to MS Windows: Features of Windows; Various versions of Windows & its use; Working with Windows;

My Computer Use: Opening, Content, Short Cut to Open, Recycle bin : Use, Moving and restoring files to and from Recycle bin. Delete File directly without sending to Recycle Bin. Empty Recycle Bin. Short cut key uses for Recycle bin.

Desktop : Definition, Purpose, Component, Changing Desktop theme, Default Icons, Windows Explorer : Purpose and Using Mechanism.

Screen description & working styles of Windows; Dialog Boxes & Toolbars; Working with Files &

Folders; simple operations like copy, delete, moving of files and folders from one drive to another,

Shortcuts & Autostarts; Accessories and Windows Settings

using Control Panel- setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings,

Start button & Program lists; Installing and Uninstalling new Hardware & Software program on your computer.

UNIT-II

Office Packages: Office activates and their software requirements, Word-processing, Spreadsheet,

Presentation graphics, Database, introduction and comparison of various office suites like MS-Office,

Lotus-Office, Star-Office, Open-Office etc.

MS Word Basics: Introduction to MS Office, Office Button, Introduction to MS Word, Features & area of use. Working with MS Word, Quick Access toolbar, Ribbon, Ruler, Tab, Group, Document Window, Windows Control, Status bar, Scroll Bar, Title Bar, Help Button, Zoom Slide, Menus & Commands, Toolbars & Buttons, Shortcut Menus, and Wizards & Templates.

Creating a New Document, Styles, Different Page Views and layouts, Applying various Text, Finding and Replacing Text, Enhancements, Working with -Styles, Text Attributes Font, Size Color, Highlight. Paragraph and Page Formatting, Margins, Page Number, Header Footer Text Editing using various features; Bullets, Numbering, Auto formatting, Printing & various print options.



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UNIT-III

Advanced Features of MS-Word: Spell Check, Thesaurus, Find & Replace; Headers & Footers, Inserting - Page Numbers, Pictures, Files, Auto texts, Symbols etc., Working with Columns, Tabs & Indents, Creation & Working with Tables including conversion to and from text, Margins & Space management in Document, Adding References and Graphics, Mail Merge Select Document Type, Various methods of selecting Recipients, Creating Document, Merging, Creating Envelops & Mailing Labels. Importing and exporting to and from various formats.

UNIT-IV

MS Excel: Introduction and area of use, Working with MS Excel, concepts of Workbook & Worksheets, Row, Column and Cell, Menus and Dialog box, Sheets, Using Wizards, Various Data Types, Using different features with Data, Cell and Texts, Inserting, Removing & Resizing of Columns & Rows, Working with Data & Ranges, Different Views of Worksheets, Column Freezing, Labels, Hiding, Splitting, Using different features with Data and Text, Use of Formulas, Calculations & Functions: Logical, Database, Date and Time, Information, Mathematical and statistical Functions.

Cell Formatting: Format cell Dialogue Box, Borders & Shading, Decimal Places, Date and Time Formats, Fractions, Currency vs Accounting, Text to Numbers, Numbers to Text, Custom Number Format, Format Painter, Cell Styles, Themes

Working with Different Chart Types: Create chart, Change Chart Type, Switch Row/Column, Chart Title, Legend Position, Data Labels. Printing of Workbook & Worksheets with various options.

UNIT-V

MS PowerPoint: Introduction & area of use, Working with MS PowerPoint, The Main Screen Component, Creating a New Presentation, Working with Presentation Color, Transition, Drawing tool, Using Wizards; Slides & its different views, Inserting, Deleting and Copying of Slides; Working with Notes, Handouts, Columns & Lists, Adding Graphics, Sounds and Movies to a Slide; Working with PowerPoint Objects, Designing & Presentation of a Slide Show, Custom Animation with Timing, Chart effect, Action.

button and Action Settings, Determining What to Animate, Automate Presentation. Printing Presentations, Notes, and Handouts with print options.

Outlook Express: Features and uses, Configuration and using Outlook Express for accessing e-mails in office.

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TEXT & REFERENCE BOOKS:

WINDOWS XP COMPLETE REFERENCE. BPB PUBLICATIONS MS

OFFICE XP COMPLETE BPB PUBLICATION

MS WINDOWS XP HOME EDITION COMPLETE, BPB PUBLICATION.

JOE HABRAKEN, MICROSOFT OFFICE 2000, 8 IN 1, BY, PRENTICE HALL OF INDIA

I.T. TOOLS AND APPLICATIONS, BY A. MANSOOR, PRAGYA PUBLICATIONS, MATURA

PC Packages LAB:-**Skills to be Covered:**

1. Advanced functions and formulas (e.g., VLOOKUP, INDEX-MATCH, IFERROR, nested functions).
2. PivotTables and PivotCharts for dynamic data analysis.
3. Data validation and conditional formatting for improved data quality and visualization.
4. Using Excel's statistical functions for data analysis (e.g., AVERAGEIF, COUNTIFS, SUMIFS).
5. Incorporating external data sources (e.g., SQL databases, web queries) into Excel for analysis.
6. Creating interactive dashboards with slicers, timelines, and dynamic charts.
7. Visual Basic for Applications (VBA) macros for automating repetitive tasks and customizing Excel functionality.
8. Advanced charting techniques (e.g., waterfall charts, Pareto charts, heatmaps) for insightful visualization.
9. Collaboration and sharing features in Excel (e.g., co-authoring, version history).
10. Data analysis add-ins and tools available for Excel (e.g., Solver, Analysis ToolPak).
11. Practical Activities:

Advanced Functions: Perform complex data manipulations using VLOOKUP, INDEX-MATCH, and nested functions.

1. PivotTables and PivotCharts: Analyze large datasets and create dynamic visualizations using PivotTables and PivotCharts.
2. Data Validation and Conditional Formatting: Implement data validation rules and conditional formatting to enhance data integrity and visualization.
3. Statistical Analysis: Apply Excel's statistical functions to analyze data trends and patterns.
4. External Data Integration: Import data from external sources and perform analysis within Excel.
5. Interactive Dashboards: Design interactive dashboards with slicers, timelines, and dynamic charts.

6. to explore data visually.
7. VBA Macros: Record and write VBA macros to automate repetitive tasks and customize Excel functionality.
8. Advanced Charting: Create advanced charts like waterfall charts, Pareto charts, and heatmaps for insightful data visualization.
9. Collaboration and Sharing: Explore collaboration features and share workbooks securely with peers.
10. Add-ins and Tools: Install and utilize Excel add-ins for specialized data analysis tasks.

Assessment:

1. Evaluation of the accuracy and efficiency of data analysis performed using Excel functions and tools.
2. Presentation of data analysis results through visually appealing and insightful charts and dashboards.
3. Practical examination where students demonstrate their ability to utilize advanced Excel features to solve complex data-related problems.
4. Additional Resources:
5. Online tutorials and courses on advanced Excel functions and data analysis techniques.
6. Excel forums and communities for troubleshooting and sharing best practices.
7. Official Microsoft Excel documentation and support resources for in-depth guidance.

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BBIT0201T : OBJECT ORIENTED PROGRAMMING WITH C++

UNIT-I

(12Lectures)

Introduction to object oriented programming, user defined types, structures, unions, polymorphism, encapsulation. Getting started with C++ syntax, data-type, variables, strings, functions, default values in functions, recursion, namespaces, operators, flow control, arrays and pointers.

UNIT- II

(14Lectures)

Abstraction mechanism: Classes, private, public, constructors, destructors, member data, member functions, inline function, friend functions, static members, and references.

Inheritance: Class hierarchy, derived classes, single inheritance, multiple, multilevel, hybrid inheritance, role of virtual base class, constructor and destructor execution, base initialization using derived class constructors.

UNIT- III

(12Lectures)

Polymorphism: Binding, Static binding, Dynamic binding, Static polymorphism: Function Overloading, Ambiguity in function overloading, Dynamic polymorphism: Base class pointer, object slicing, late binding, method overriding with virtual functions, pure virtual functions, abstract classes.

UNIT- IV

(10Lectures)

Operator Overloading: This pointer, applications of this pointer, Operator function, member and non member operator function, operator overloading, I/O operators. Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture and release.

UNIT- V

(12Lectures)

Dynamic memory management, new and delete operators, object copying, copy constructor, assignment operator, virtual destructor. Template: template classes, template functions.

Standard Template Library: Fundamental idea about string, iterators, hashes, iostreams and other types. Namespaces: user defined namespaces, namespaces provided by library. Object Oriented Design, design and programming, role of classes.

Text Books:

1. Object Oriented Programming with C++ by E. Balagurusamy, McGraw-Hill Education (India)
2. ANSI and Turbo C++ by Ashoke N. Kamthane, Pearson Education

Reference Books:

3. Big C++- Wiley India
4. C++:The Complete Reference- Schildt, McGraw-Hill Education (India)
5. C++ and Object Oriented Programming – Jana, PHI Learning.
6. Object Oriented Programming with C++- Rajiv Sahay, Oxford
7. Mastering C++-Venugopal, McGraw-Hill Education (India)

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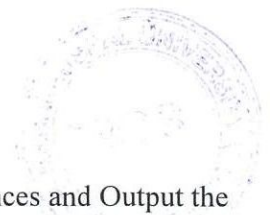
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LIST OF PRACTICALS OF C++

1. Write a Program That Just Outputs 'Hello World
2. Write a Program to Find Maximum and Minimum of Given 3 Numbers.
3. Write a Program That Output Value as Number and as Character.
4. Implementation of the Function That Calculates the Cross Sum of an Integer.(123 as 1+2+3).
5. Determine Number of Characters in a String.
6. Raising a Number N to a Power P is the Same as Multiplying N By Itself P Times. Write a Function Called Power () That Takes a Double Value for N and an INT Value for P and Returns the Result as Double Value. use a Default Argument of 2 for P So That If This Argument is Omitted the Number Will Be Squared. Write a Main () Function That Gets Values from the User to Test This Function.
7. Write a C++ Program to Sort an Array of Integer in Ascending Order Using a Function Called Exchange() Which Accepts Two Integer Arguments By Reference.
8. Write a C++ Program to Implement Function Overloading in Order to Compute.
9. Write a C++ Program to Implement Power(MN) Where
 - I) M is Double and N is Int II) M and N are Int.
10. Write a Program That Uses a Structure Called Point to Model a Point. Define Three Points and Have the User Input Values to Two of Them. Then Set the Third Point Equal to the Sum of the Other Two and Display the Value of the New Point. Interaction with the Program Might Look Like This:
 Enter Coordinates for P1: 3 4
 Enter Coordinates for P2: 5 7 Coordinates of P1 + P2 are: 8 11
11. Create the Equivalent of a Four Function Calculator. the Program Should Request the User to Enter a Number an Operator and Another Number. It Should Then Carry Out the Specified Arithmetical Operation: Adding Subtracting Multiplying Or Dividing the Two Numbers. (It Should use a Switch Statement to Select the Operation). Finally It Should Display the Result. When It Finishes the Calculation the Program Should Ask If the User Wants to Do Another Calculation. the Response Can Be Y Or N. Some Sample Interaction with the Program Might Look Like This.
 Enter First Number Operator Second Number: 10/ 3 Answer = 3.333333
 Do Another (Y/ N)? Y
 Enter First Number Operator Second Number 12 + 100 Answer = 112
 Do Another (Y/ N)? N
12. Create a 'Distance' Class with :
 - ☐ Feet and Inches as Data Members
 - ☐ Member Function to Input Distance
 - ☐ Member Function to Output Distance
 - ☐ Member Function to Add Two Distance Objects
 - ☐ Write a Main Function to Create Objects of Distance Class. Input Two Distances and Output the



Sum.

13. Create a Class Called 'Time' That Has

- ☐ Three Integer Data Members for Hours Minutes and Seconds
- ☐ Constructor to Initialize the Object to Zero
- ☐ Member Function to Add Two Time Objects
- ☐ Member Function to Display Time in Hh:Mm:Ss Format
- ☐ Write a Main Function to Create Two Time Objects Add Them and Display the Result in Hh:Mm:Ss Format.

14. Create a Class Called 'Employee' That Has

- ☐ Empcode and Empname as Data Members
- ☐ Member Function Getdata() to Input Data
- ☐ Member Function Display() to Output Data
- ☐ Write a Main Function to Create Emp an Array of Employee Objects. Accept and
- ☐ Display the Details of At Least 6 Employees.

15. Create a Class Rational Which Represents a Numerical Value by Two Double Values- Numerator & Denominator. Include the Following Public Member Functions: Constructor with No Arguments (Default). Constructor with Two Arguments.

- ☐ Void Reduce() That Reduces the Rational Number By Eliminating the Highest Common Factor Between the Numerator and Denominator.
- ☐ Overload + Operator to Add Two Rational Number.
- ☐ Overload >> Operator to Enable Input Through Cin.
- ☐ Overload << Operator to Enable Output Through Cout.
- ☐ Write a Main () to Test All the Functions in the Class.

16. Create a Class 'Complex' to Hold a Complex Number. Write a Friend Function to add Two Complex Numbers. Write a Main Function to Add Two Complex Objects.

17. Create a 'Matrix' Class of Size M X N. Overload the '+' Operator to Add Twomatrix Objects. Write a Main Function to Implement It.

18. Create a 'String' Class Which Overloads '==' Operator to Compare Two Stringobjects.

19. Create a Base Class Called 'Shape' Having

- ☐ Two Data Members of Type Double.
- ☐ Member Function Get-Data() to Initialize Base Class Data Members.

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BBIT0202T: DISCRETE MATHEMATICS

Unit I

(10Lectures)

Logic: Propositional equivalence, predicates and quantifiers, Methods of proofs, proof strategy, sequences and summation, mathematical induction, recursive definitions and structural induction, program correctness.

Unit-2

(10Lectures)

Counting: The basics of counting, the pigeonhole principle, permutations and combinations, recurrence relations, solving recurrence relations, generating functions, inclusion-exclusion principle, application of inclusion-exclusion.

Unit -3

(16Lectures)

Relations: Relations and their properties, n-array relations and their applications, representing relations, closure of relations, equivalence of relations, partial orderings.

Graph theory: Introduction to graphs, graph terminology, representing graphs and graph isomorphism, connectivity, Euler and Hamilton paths, planar graphs, graph coloring, introduction to trees, application of trees.

Unit -4

(12Lectures)

Group theory: Groups, subgroups, generators and evaluation of powers, cosets and Lagrange's theorem, permutation groups and Burnside's theorem, isomorphism, automorphisms, homomorphism and normal subgroups, rings, integral domains and fields.

Unit -5

(12Lectures)

Lattice theory: Lattices and algebras systems, principles of duality, basic properties of algebraic systems defined by lattices, distributive and complimented lattices, Boolean lattices and Boolean algebras, uniqueness of finite Boolean expressions, propositional calculus. Coding theory: Coding of binary information and error detection, decoding and error correction.

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Text Books:

- 1) K.H. Rosen: Discrete Mathematics and its application, 5th edition, Tata McGraw Hill. Chapter 1 (1.1-1.5), Chapter 3 (3.1-3.4, 3.6), Chapter 4 (4.1-4.3, 4.5), Chapter 6 (6.1, 6.2, 6.4-6.6) Chapter 7 (7.1-7.6), Chapter 8 (8.1-8.5, 8.7, 8.8)
2. C.L. Liu: Elements of Discrete Mathematics, 2nd edition, TMH 2000. Chapter 11 (11.1-11.10 except 11.7), Chapter 12 (12.1-12.8)
- 2.3. B. Kalman: Discrete Mathematical Structure, 3rd edition, Chapter 1 (11.1, 11.2)

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BBIT0301T :Object Oriented Concepts using JAVA

Unit-I

(8Lectures)

Fundamentals of Object-Oriented Programming: Introduction, Object Oriented Paradigm, BasicConceptsofOOP,BenefitsandApplicationsofOOP.IntroductiontoJava:JavaFeatures, Java Environment, Simple Java Program, Java Program Structure, Java Tokens, Java Statements, Java Virtual Machine.

Unit-II

(14Lectures)

Java Programming Basics: Constants, Variables, Data Types, Declaration of variables, Giving values to the variable, Scope of variables, Symbolic constants, Type casting.

Operators and Expressions :Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operator, Increment and Decrement Operators, Conditional Operator, Special Operators, Mathematical functions. Using I/O: Byte streams and character streams, predefined streams, reading console input, reading characters, strings, writing console output.

Decision Making & Branching: Simple if statement, if..else statement, nesting of if..else statement, the else..if ladder, the Switch statement.

Unit-III

(12Lectures)

Decisionmaking&Looping-Thewhilestatement,thedostatement,theforstatement.Jumpsin loops, Labelled loops.Class & Objects - Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The 'this' keyword, Overloading Methods, Using Objects as Parameters, Returning Objects, Recursion, Understanding 'static', Introducing 'final ', Using Command-LineArguments,Varargs :Variable-LengthArguments Arrays and Strings: One dimensional arrays, Creating an arrays, Two dimensional arrays , Strings, Vectors, Wrapper classes.

Unit-IV

(12Lectures)

Inheritance-InheritanceBasics,Using'super,CreatingMultilevelhierarchy,Methodverriding, Using Abstract Classes, Using final with Inheritance.

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Packages & Interfaces - Packages, Access protection in packages, Importing Packages, Interfaces. Exception Handling - Exception Handling Fundamentals –Exception Types, Uncaught

Exceptions, Using try and catch, Multiple catch clauses, Nested try statements, throw, throws, finally, Java's built-in Exceptions.

Unit-V

(14 Lectures)

Multithreaded Programming- Introduction, Creating threads, Extending the thread class, stopping & blocking thread, Life cycle of a thread, Using thread methods, Implementing the runnable interface.

Event and GUI programming: The Applet Class, Types of Applets, Applet Basics, Applet Architecture, An Applet Skeleton, SimpleApplet Display Methods, Requesting Repaint, The HTMLAPPLET tag. Event Handling - The delegation event model, Event Classes –Action Event, KeyEvent & MouseEvent Classes, Event Listener Interfaces –ActionListener, KeyListener & MouseListener interfaces. Using the Delegation Event Model. Window Fundamentals, Working with Frame Windows, Creating a Frame Window in an Applet. Creating a Windowed Program, Displaying information within a window.

Introducing swing – two key swing features, components and containers, the swing packages, a simple swing application, event handling. Exploring Swing- JLabel, JTextField, JButton, Check boxes, Radio buttons, JList, JComboBox.

Reference Books:

- E Balagurusamy, Programming with Java – A Primer, Fourth Edition, Tata McGraw Hill Education Private Limited.
- Herbert Schildt, Java: The Complete Reference, Seventh Edition, McGraw Hill Publication.
- Herbert Schildt, Java 2 - The Complete Reference, Fifth Edition, McGraw Hill publication.
- Cay S. Horstmann, Core Java Volume I – Fundamentals, Prentice Hall.
- Somashekara, M. T., Guru, D. S., Manjunatha, K. S., Object Oriented Programming with Java, EEE Edition, PHI.

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:JAVA Lab List of Programs:

1. Program to accept student name and marks in three subjects. Find the total marks, average and grade (depending on the average marks)
2. A menu driven program to input two integers & an operator to perform basic arithmetic operations (+, -, * and /) using switch case structure.
3. Program, which reads two numbers having same number of digits. The program outputs the sum of product of corresponding digits. (Hint Input 327 and 539 output $3 \times 5 + 2 \times 3 + 7 \times 9 = 84$)
4. Program to input Start and End limits and print all Fibonacci numbers between the ranges. (Use for loop)
5. Define a class named Pay with data members String name, double salary, double da, double hra, double pf, double grossSal, double netSal and methods: Pay(String n, double s) - Parameterized constructor to initialize the data members, void calculate() - to calculate the following salary components, and void display() - to display the employee name, salary and all salary components.

Dearness Allowance = 15% of salary
 HouseRentAllowance = 10% of salary
 Provident Fund = 12% of salary

GrossSalary = Salary + DearnessAllowance + HouseRentAllowance
 Net Salary = Gross Salary - Provident Fund

Write a main method to create object of the class and call the methods to compute and display the salary details.

6. Program to create a class DISTANCE with the data members feet and inches. Use a constructor to read the data and a member function Sum () to add two distances by using objects as method arguments and show the result. (Input and output of inches should be less than 12.)

7. Program to check whether the given array is Mirror Inverse or not.

8. Program to create a class "Matrix" that would contain integer values having varied numbers of columns for each row. Print row-wise sum.

9. Program to extract portion of character string and print extracted string. Assume that 'n' characters extracted starting from mth character position.

10. Program to add, remove and display elements of a Vector.

BBIT0302T: COMPUTER GRAPHICS

Unit 1: Introduction and Line Generation:- Types of computer graphics, Graphic displays: Random scan and raster scan displays, Frame buffer and video controller, Line drawing algorithms (DDA, Bresenham), Circle generating algorithms (Midpoint circle algorithm).

Unit 2: 2D Transformations and Clipping:- Basic transformations: Translation, scaling, rotation, reflection, and shearing, Matrix representation and homogeneous coordinates, Composite transformations, Windowing and clipping: Viewing pipeline, 2D clipping algorithms (Cohen-Sutherland, Liang-Barsky), polygon clipping (Sutherland-Hodgeman).

Unit 3: 3D Transformations and Viewing:- 3D geometric primitives and object representation, 3D transformations: Translation, rotation, scaling, reflection, and shearing, 3D viewing, projections (parallel and perspective), 3D clipping.

Unit 4: Curves and Surfaces:- Curve representation: Spline, B-spline, and Bezier curves, Surface representation: Quadric surfaces (spheres, ellipsoids), polygon meshes, blobby objects.

Unit 5: Hidden Lines and Surface Detection:- Algorithms: Back-face detection, depth buffer (Z-buffer), A-buffer, scan-line method, Basic illumination models: Ambient light, diffuse and specular reflection, Phong model, Color consideration, transparency, shadows.

Textbooks:

"Computer Graphics: Principles and Practice" by John F. Hughes, Andries van Dam, Morgan McGuire, et al.

"Computer Graphics with OpenGL" by Donald Hearn and M. Pauline Baker

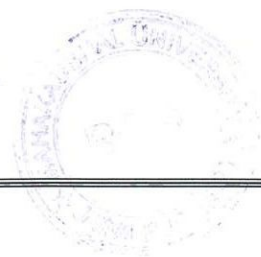
Reference Books:

"Interactive Computer Graphics: A Top-Down Approach with WebGL" by Edward Angel and Dave Shreiner

"Fundamentals of Computer Graphics" by Peter Shirley, Michael Ashikhmin, and Steve Marschn

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COMPUTER GRAPHICS LAB:-

1. Line Drawing Algorithms
2. Implement the Digital Differential Analyzer (DDA) and Bresenham's line drawing algorithms to draw lines on the screen.
3. Circle and Ellipse Drawing Algorithms
4. Implement the Midpoint circle algorithm and Midpoint ellipse algorithm to draw circles and ellipses.
5. 2D Transformations
6. Write programs to perform basic 2D transformations including translation, rotation, scaling, reflection, and shearing on a given set of points.
7. Clipping Algorithms
8. Implement Cohen-Sutherland and Liang-Barsky line clipping algorithms for clipping lines against a rectangular window.
9. Implement the Sutherland-Hodgman algorithm for polygon clipping.
10. 3D Transformations
11. Implement 3D transformations including translation, rotation, and scaling on a given set of 3D points or objects.
12. Bezier and B-Spline Curves
13. Write programs to create and manipulate Bezier curves and B-spline curves for given control points.
14. Hidden Surface Removal
15. Implement the Z-buffer algorithm and Back-face culling for hidden surface removal in 3D scenes.
16. Illumination and Shading
17. Implement basic illumination models including ambient, diffuse, and specular reflections.
18. Implement shading techniques such as flat shading, Gouraud shading, and Phong shading.
19. Texture Mapping
20. Implement basic texture mapping techniques to map a 2D image onto a 3D object's surface.
21. Introduction to OpenGL.
22. Write simple OpenGL programs to render basic geometric shapes and apply transformations and lighting.

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BBIT0401T : DIGITAL ELECTRONIC AND COMPUT ORGANIZATION

UNIT-I

(12Lectures)

Data Representation Data Types and Number Systems Binary Number System Octal & Hexa-Decimal Number System Fixed Point Representation 1's & 2's Complement Binary Fixed-Point Representation Arithmetic Operation On Binary Numbers Overflow & Underflow Floating Point Representation Codes ASCII EBCDIC Codes Gray Code Excess-3 & BCD Error Detection & Correcting Codes Binary Storage and Registers.

UNIT- II

(14Lectures)

Boolean Algebra and Digital Logic Circuits -Logic Gates and OR NOT Gates and Their Truth Tables NOR, NAND & XOR Gates Boolean Algebra Basic Definition and Properties Basic Boolean Law's Demorgan's Theorem Map Simplification Minimization Techniques K Map – Two Three and More Variables Maps Sum of Product & Product of Sums Don't Care Conditions Combination Circuits Half Adder & Full Adder, Full Subtractor, and Decimal Adder Code Conversion Multilevel NAND and NOR Circuits Multiplexers and Demultiplexers, RAM and ROM Working & Circuit

UNIT- III

(12Lectures)

Sequential Circuits Flip-Flops - RS D JK & T Flip-Flop Triggering in Flip Flops Analysis of Clocked Sequential Circuits State Reduction and Assignment Flip Flop Excitation Tables Registers Counters and the Memory UNIT Shift Registers Ripple Counters and Synchronous Counters Design of Counters. Common Bus System Computer Instructions Timing and Control Instruction Cycle Memory-Reference Instructions Complete Computer Description

UNIT- IV

(10Lectures)

Design of Basis Computer Control Logic Gates Control of Registers and Memory Design of Accumulator Logic Control of Ac Register Adder and Logic Circuit Multiple Bus Organization of Computer Memory Addressing Micro Program Programming the Basis Computer Machine Languages Assembly Language.

UNIT- V

(12Lectures)

Input-Output Organizations- I/O Interface I/O Devices Isolated Vs Memory-Mapped I/O Synchronous & Asynchronous Data Transfer. Memory Organization - Auxiliary Memory Magnetic Drum Disk & Tape Semi-Conductor Memories Direct Memory Access (DMA)

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Memory Hierarchy Main Memory Auxiliary Memory Associative Memory Cache Memory Virtual Memory Address Space & Memory Space Address Mapping Page Table Page Replacement Segmentation Cache Memory Hit Ratio Mapping Techniques Memory Management Hardware.

Reference Books:

- 1.M. Morris Mano-Computer System Architecture Revised 3rd Edition Pearson Publication.
- 2.Morris Mano-Digital Logic and Computer Design.

BBIT0401-P DIGITAL ELECTRONIC Lab:-

1. Instruction Set Architecture (ISA) Design:
 2. Define a simple instruction set architecture, including instruction formats, opcode definitions, and addressing modes.
 3. Specify the instruction set's functionality, such as arithmetic and logic operations, memory access, and control flow instructions.
4. Processor Architecture Design:
 5. Design the architecture of the processor, including the datapath and control unit.
 6. Select appropriate components such as registers, ALU (Arithmetic Logic Unit), program counter, and instruction register.
7. Instruction Execution:
 8. Implement the instruction execution cycle, including instruction fetch, decode, execute, and write-back stages.
 9. Develop control logic to decode instructions and generate control signals for the datapath components.
10. Memory Interface:
 11. Interface the processor with memory modules for instruction and data storage.
 12. Implement memory access instructions to load and store data from/to memory.
13. Testing and Debugging:
 14. Test the processor design using a set of assembly language programs or machine code instructions.

15. Debug any errors or inconsistencies in the processor's behavior through simulation or hardware testing.
16. Performance Evaluation:
17. Evaluate the performance of the processor in terms of execution speed, throughput, and resource utilization.
18. Compare the performance metrics with theoretical expectations and optimize the design as needed.
19. Documentation and Presentation:
20. Document the design specifications, implementation details, and test results in a comprehensive report.
21. Prepare a presentation summarizing the project objectives, methodology, design decisions, and outcomes.

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BBIT0402T: Machine learning technique

UNIT-I INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS (10Lectures)

Fundamentals Of Neural Networks – Model of Artificial Neuron – Neural Network Architectures – Learning Methods – Taxonomy Of Neural Network Architectures – Applications.

UNIT II FEED FORWARD NEURAL NETWORKS (12Lectures)

Perceptron Models: Discrete, Continuous and Multi-Category – Training Algorithms: Discrete and Continuous Perceptron Networks – Limitations of the Perceptron – Model. Credit Assignment Problem – Generalized Delta Rule, Derivation of Back propagation (BP) Training, and Summary of Back propagation Algorithm – Kolmogorov Theorem.

UNIT III: MACHINE LEARNING (14Lectures)

Machine Learning Fundamentals – Types of Machine Learning - Supervised, Unsupervised, Reinforcement- The Machine Learning process. Terminologies in ML- Testing ML algorithms: Overfitting, Training, Testing and Validation Sets- Confusion matrix - Accuracy metrics- ROC Curve- Basic Statistics: Averages, Variance and Covariance, The Gaussian- The Bias-Variance trade off- Applications of Machine Learning.

UNIT IV: SUPERVISED LEARNING (12Lectures)

Regression: Linear Regression – Multivariate Regression- Classification: Linear Discriminant Analysis, Logistic Regression- K-Nearest Neighbor classifier. Decision Tree based methods for classification and Regression- Ensemble methods.

UNIT V: UNSUPERVISED LEARNING (12Lectures)

Clustering- K-Means clustering, Hierarchical clustering - The Curse of Dimensionality - Dimensionality Reduction - Principal Component Analysis - Probabilistic PCA- Independent Components analysis

TEXT BOOKS:-

1. Charu C. Aggarwal “Neural Networks and Deep learning” Springer International Publishing, 2018

2. Satish Kumar, “Neural Networks, A Classroom Approach”, Tata McGraw Hill, 2007.

3. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012



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- 4..Stephen Marsland, “Machine Learning –An Algorithmic Perspective”, CRC Press, 2009.
- 5.Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das,
“Machine Learning”,Pearson Education, 2018.
- 6.Christopher Bishop, “Pattern Recognition and Machine Learning” Springer, 2011.

REFERENCE BOOKS

- 1.Andreas C. Muller, “Introduction to Machine Learning with Python: A Guide for DataScientists”, O'Reilly,2016.
- 2.Sebastian Raschka, “Python Machine Learning”, Packt Publishing, 2015.
- 3.Hastie, Tibshirani, Friedman, “The Elements of Statistical Learning: Data Mining,Inference, and Prediction”,2nd Edition, Springer, 2017.
- 4.Ethem Alpaydin, “Introduction to Machine Learning”, 2nd Revised edition, MITPress,2010.
- 5.

LIST OF EXPERIMENTS

1. Implement and demonstratethe FIND-Salgorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithmto output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge toclassify a new sample.
4. Build an Artificial Neural Network by implementing the Backpropagationalgorithm and test the same using appropriate data sets.
- 5.Write a program to implement the naïve Bayesian classifier for a sample training data set.

stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.
You can use Java/Python ML library classes/API.

8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

REFERENCES:-

- : 1. Christopher Bishop, "Pattern Recognition and Machine Learning" Springer, 2007.
2. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", Chapman and Hall, CRC Press, Second Edition, 2014.
3. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012.
4. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Third Edition, 2014.
5. Tom Mitchell, "Machine Learning", McGraw-Hill, 1997.

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BBIT0501T:Python Programming

Unit-I

(12Lectures)

PythonBasics,Objects-PythonObjects,StandardTypes,OtherBuilt-inTypes,InternalTypes,StandardTypeOperators,StandardTypeBuilt-inFunctions,CategorizingtheStandardTypes,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

(16Lectures)

FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-lineArguments, File System, File Execution, Persistent StorageModules,RelatedModulesExceptions:ExceptionsinPython,DetectingandHandling Exceptions, Context Management, *Exceptions as Strings, Raising Exceptions, Assertions, StandardExceptions,*CreatingExceptions,WhyExceptions(Now)?,WhyExceptionsatAll?, Exceptions and the sys Module, Related Modules Modules: Modules and Files, Namespaces, ImportingModules,ImportingModuleAttributes,ModuleBuilt-inFunctions,Packages,Other Features of Modules.

Unit-III

(10Lectures)

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

(12Lectures)

GUIProgramming:Introduction,TkinterandPythonProgramming,BriefTourofOtherGUIs, RelatedModulesandOtherGUIsWEBProgramming:Introduction,WedSurfingwithPython, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGIApplicationAdvanced CGI, Web (HTTP) Servers.

Unit-V

(10Lectures)

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

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Reference Books:

- CorePythonProgramming, WesleyJ.Chun, SecondEdition, Pearson.
- ThinkPython, AllenDowney, GreenTeaPress
- IntroductiontoPython, KennethA.Lambert, Cengage
- PythonProgramming:AModernApproach, VamsiKurama, Pearson
- LearningPython, MarkLutz, O'Really.

:PythonProgrammingLab**List of Programs:**

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and access its sub-string from a given string.
4. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
5. Write a program to create, append, and remove lists in python.
6. Write a program to demonstrate working with tuples in python.
7. Write a program to demonstrate working with dictionaries in python.
8. Write a python program to find the largest of three numbers.
9. Write a Python program to convert temperature to and from Celsius, Fahrenheit. [Formula : $c/5 = f-32/9$]
10. Write a Python program to construct the following pattern, using a nested for loop.

```

*
* *
* * *
* * * *
* * * * *
* * * * *
* * * *
* * *
* *
*

```

11. Write a Python script that prints prime numbers less than 20.
12. Write a python program to find factorial of a number using Recursion.
13. Write a program that accepts the lengths of three sides of a triangle as inputs. The

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15. program output should indicate whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of the squares of the other two sides)
16. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
17. Write a python program to define a module and import a specific function in that module to another program.
18. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
19. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
20. File in alphabetical order
21. der.
22. Write a Python class to convert an integer to a roman numeral.
23. Write a Python class to implement $\text{pow}(x, n)$.
24. Write a Python class to reverse a string word by word.

Reference Books:

- Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
- Think Python, Allen Downey, Green Tea Press
- Introduction to Python, Kenneth A. Lambert, Cengage
- Python Programming: A Modern Approach, Vamsi Kurama, Pearson
- Learning Python, Mark Lutz, O'Really.

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BBIT0601T: WEB PROGRAMMING AND PHP

UNIT I:

HTML –

(12 Lectures)

General Introduction to Internet and WWW; **HTML:** Structured language, Document types, Rules of HTML, HTML tags, Head tags, Body tags, Headings, Divisions and Centering, Quotations, Preformatted text, Lists, Horizontal Rules, Block level elements, Text level elements, Character entities, Comments, Fonts, Tables: Table tags, Colors, Color names, Color values, Marquee tag.

UNIT II

Advanced HTML –

(10 Lectures)

Linking in HTML: Anchor tags, Layer tags, Link relationships, URL: Relative, Absolute, Image, Image maps, Frames: Layouts, Targeting, No frame tag, Floating frames, Audio, Embed tag, Forms: form tag and its attributes.

UNIT III:

CSS:

(12 Lectures)

Style sheet Basics, Adding Style to a Document, CSS (Cascading Style Sheet) and HTML Elements, Selectors, Document Structure and Inheritance. **Javascript** - Introduction to Javascript, Variables and data types, Declaring Variables, Operators, Control Structures, Conditional Statements, Loop Statements, Functions, Objects, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes, Javascript with HTML, Events, Introduction to DHTML - Components, Uses, Features.

UNIT III:

PHP:

(10 Lectures)

Overview of PHP, The building blocks of PHP: variables, globals & superglobals, Data types: Set type, typecasting, test type, Operators & Expressions, Flow control functions in PHP, Functions: Defining a function variable scope, calling a function

returning values, setting default values for arguments, passing variable reference, built in functions

UNIT IV:

Arrays:

(16 Lectures)

Creating arrays (associative & multidimensional), Array related functions. Working with Objects, Working with string functions: Formatting strings, Using Date and Time functions. Forms in PHP: Form elements, adding elements to a form, creating a simple input form, combining HTML & PHP code on a single page, redirecting the user, creating a send mail form, File upload form, working with files and directories. **Cookies:** Introduction, different types of cookies, setting a cookie with PHP, deleting a cookie, session function overview: starting a session, working with session variables.

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CORETEXTBOOK:

1. V.K.Jain,AdvancedProgramminginWebDesign,CyberTechPublications
2. JulieC.Meloni,PHP,MySQLandApache,PearsonEducation

ADDITIONALREFERENCES:

1. IvanBayross“WebEnabledCommercialApplicationDevelopment:HTML,DHTML,JavaScript, PERL CGI- PHI, IvanByross, PHPfor Beginners –PHI

BDSC601P: Web Programming and PHP lab**(HTML/ JAVASCRIPT)**

1. PracticingbasicHTMLtags,tagteststyles,paragraphstyles,headings,lists
2. TablesinHTML,FramesinHTML,nestedframes,LinkandAnchorTags
3. Includinggraphics,videoandsoundinwebpages,includingJavaapplets
4. Layers&ImageMaps
5. CreatinganimatedGifs
6. CascadingStyle sheets
7. DHTML
8. HTMLforms andFields
9. ExercisescoveringbasicintroductiontoJavaScript
10. Developmentofawebsiteinvolvingavarietyoftoolspracticed above

(PHP)Sample Questions

1. *SetupWAMP/XAMPPServerorSetupApache,MySQLandPHPseparately inyourPHPLab.*
2. WriteaPHPprogramtogeneratearandomnumberbetween1and 100.
3. ModifyaboveprogramtoacceptrangeoftherandomnumberfromHTMLinteface.
4. Programsinvolvingvariouscontrolstructureslikeif,else,elseif/elseif’,AlternativeSyntaxfor ‘if, else, elseif/else if’
5. Programsinvolvingvariouscontrolstructureslikewhile,do-while,for,foreach,switch,break, continue. Try alternative syntax for while, do-while, for, foreach, switch.
6. Programsinvolvingthedeclare,return,require,include,require-once,include _onceandgoto.
7. ProgramstodemonstratePHPArrayfunctions,PHPArraySorting,PHPKeySorting,PHPValue Sorting, PHP Multi Array Sorting, PHPArray Random Sorting,
8. ProgramstodemonstratePHPArrayfunctions.PHPArrayReverseSorti.
9. ng,ArraytoString Conversion, Implode() function, String toArray,Array Count, Remove Duplicate Values
- 10.ProgramstodemonstratePHPArrayfunctions.arraySearch,ArrayReplace,ArrayReplace Recursive, Array Sub String Search
- 11.Demonstratetheuseofregularexpressionstocomparetwostrings.
- 12.ExtractDomainnamefromURL
- 13.Findthenumberofrowsfromamysqldatabaseforyour query.



14. Generate a Guestbook which will allow your website visitor to enter some simple data about your website.
15. Write a PHP script to find whether the given number is a prime or not.
16. Write a PHP script to demonstrate the use of break, continue statements using nested loops.
17. Write a PHP script to display the Fibonacci sequence with HTML page.
18. Write a PHP script to create a chessboard.
19. Write a PHP script using built-in string function like strpos(), strpos(), substr_count(), etc
20. Write a PHP script to transform a string to uppercase, lowercase letters, make a string's first character uppercase.
21. Write a PHP function to check whether all array values are strings or not.
22. Write a PHP script to count number of elements in an array and display a range of array elements.

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BBIT0701T: Assembly language Programming

Unit-I

(10Lectures)

Computer Architecture: Processor to memory communication, processor to I/O device communication, Instruction Format; **Instruction Cycle:** Fetch Cycle, Execution Cycle; Instruction Set: CISC Architecture, RISC Architecture, Comparison; Memory Chips; Pipelining and Parallel Processing;

Unit-II

(10Lectures)

Input / Output Organization: Asynchronous Data Transfer, Programmed I/O (concepts only); DMA: DMA Controller, DMA Transfer Modes; I/O Processor.

Unit-III

(18Lectures)

The 8086 Microprocessor: 8086 Internal Architecture: Execution Unit, Bus Interface Unit, Multiplexing of address/ data bus, 8086 registers, **Memory bank:** Even bank, Odd Bank, Pins and Signals, Bus cycles, Direct Memory Access, DMA Transfer modes.

Unit-IV

(12Lectures)

Instruction set of 8086: Data transfer, Arithmetic, Bit manipulation, string, Branch control, Iteration control and Processor control, Addressing modes, **Interrupts:** Interrupt Vector Table, Response, Types, Priority.

Unit-V

(12Lectures)

Assembly Language Programming: Program development tools, variables and constants used in assembler, Assembler directives, Procedures and macros, Interrupts of personal computers, Hand coding of assembly language programs, examples.

TEXTBOOKS

1. NMathivanan, Microprocessors, PC Hardware and Interfacing, PHI Edition.
2. Introduction to Information Technology, 2nd Edition, ITL Education solutions limited, Pearson.

REFERENCES

1. ANagoorKani, 8086 Microprocessor and its applications, McGrawhill, second edition.
2. John D Carpinelli, Computer system organization and architecture, Pearson Education.

BDSC701P: Assembly language Programming lab

1. Arithmetic operations
2. Data movement operations
3. Control operations
4. Input-output operations
5. String operations
6. Logical operations
1. Program to move a block of data from one location to another
2. Program to find the presence of a given value in a block of data
3. Program for reverse a string
4. Program to find the number of alphabets in a word

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BBIT0702T: Optimization technique

UNIT I INTRODUCTION

(10Lectures)

Statement of an optimization problems – classification of optimization problem – classical optimization techniques; Single variable optimizations, Multi variable optimization, equality constraint, inequality constraints, No constraints.

UNIT II LINEAR PROGRAMMING

(16Lectures)

Graphical method for two dimensional problems – central problems of Linear Programming – Definitions – Simplex – Algorithm – Phase I and II of simplex Method – Revised Simplex Method. Simplex Multipliers – Dual and Primal – Dual Simplex Method – Sensitivity Analysis
– Transportation problem and its solution – Assignment problem and its solution – Assignment problem and its solution by Hungarian method – Karmakar's method – statement, Conversion of the Linear Programming problem into the required form, Algorithm.

UNIT III NON LINEAR PROGRAMMING

(16Lectures)

NON LINEAR PROGRAMMING (ONE DIMENSIONAL MINIMIZATION: Introduction – Unrestricted search – Exhaustive search – interval halving method – Fibonacci method. NON LINEAR PROGRAMMING : (UNCONSTRAINED OPTIMIZATION): - Introduction

– Random search method – Uni variate method – Pattern search methods – Hooke and jeeves method, simplex method- Gradient of a function – steepest descent method – Conjugate gradient method. NON LINEAR PROGRAMMING – (CONSTRAINED OPTIMIZATION):

Introduction – Characteristics of the problem – Random search method – Conjugate gradient method.

UNIT IV DYNAMIC PROGRAMMING

(8Lectures)

Introduction – multistage decision processes – Principles of optimality – Computation procedures.

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UNIT V DECISION MAKING

(10Lectures)

Decisions under uncertainty, under certainty and under risk – Decision trees – Expected value of perfect information and imperfect information.

TEXT BOOKS:

- 1.Kalynamoy Deb, “Optimization for Engineering Design, Algorithms and Examples”, Prentice Hall, 2012.
- 2.Hamdy A Taha, “Operations Research – An introduction”, Pearson Education ,2017

REFERENCE BOOKS:

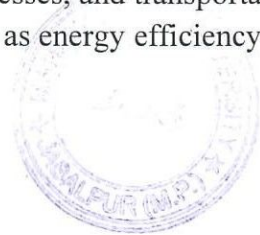
- 1.Hillier / Lieberman, “Introduction to Operations Research”, Tata McGraw Hill Publishing company Ltd, 2002.
- 2.Singiresu S Rao, “Engineering optimization Theory and Practice”, New Age International, 1996.
- 3.Mik Misniewski, “Quantitative Methods for Decision makers”, MacMillian Press Ltd., 1994.
- 4.Kambo N S, “Mathematical Programming Techniques”, Affiliated East – West press, 1991

BBIT0702P: Optimization technique LAB

1. Supply Chain Optimization: Optimizing the flow of goods and services from raw material suppliers to end customers, considering factors such as transportation costs, inventory levels, and production capacities.
2. Production Planning and Scheduling: Optimizing production schedules to minimize costs, reduce idle time, and meet demand while considering factors like machine capacities, setup times, and workforce availability.
3. Portfolio Optimization: Optimizing investment portfolios to maximize returns while managing risk, considering factors such as asset allocation, diversification, and market conditions.
4. Energy Optimization: Optimizing energy usage in buildings, industrial processes, and transportation systems to reduce costs and environmental impact, considering factors such as energy efficiency measures, renewable energy integration, and demand-side management.

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5. **Transportation Optimization:** Optimizing transportation networks and logistics operations to minimize costs, reduce delivery times, and improve vehicle utilization, considering factors such as route planning, vehicle capacities, and traffic conditions.
6. **Resource Allocation:** Optimizing the allocation of resources such as personnel, equipment, and funds to projects or tasks to maximize efficiency and achieve organizational objectives while considering constraints and priorities.
7. **Facility Location and Layout Optimization:** Optimizing the location and layout of facilities such as warehouses, manufacturing plants, and retail stores to minimize costs, maximize customer accessibility, and streamline operations.
8. **Network Optimization:** Optimizing communication and data networks to improve performance, reliability, and scalability while minimizing costs, considering factors such as network topology, traffic patterns, and bandwidth allocation.
9. **Inventory Management:** Optimizing inventory levels and ordering policies to balance the trade-off between carrying costs and stockouts, considering factors such as demand variability, lead times, and service level targets.
10. **Machine Learning Model Optimization:** Optimizing machine learning models for performance, efficiency, and generalization, considering techniques such as hyperparameter tuning, feature selection, and model architecture optimization.
11. These are just a few examples, and optimization techniques can be applied to many other domains and problems to improve decision-making and resource utilization.

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BBIT0801T: FREE AND OPEN SOURCE SOFTWARES (FOSS)

Unit-I

(12Lectures)

Open source software: concepts, features, benefits over proprietary software, examples, Free software: concepts, features, advantages, Free software Vs Open Source software, Free and Open Source Software (FOSS), Four essential freedoms, Free software movements, free software foundation(FSF), history, policies, GPL, free operating systems

Unit-II

(12Lectures)

Linux: features, history, various Linux distributions, Linux architecture, kernel and shell, Linux desktop environments- GNOME and KDE, Linux File System and Directories, types of files, Installing and Configuring Linux, File access permissions, understanding system administration

Unit III:

(16Lectures)

Linux Commands: date, time, who, echo, man, info, cal, pwd, more, less, head, tail, mkdir, cd, cp, mv, rm, touch, sort, wc, cut, cat with options, ls with options, grep with options, chmod mounting the file system, command line processing etc. Types of editors in Linux, Introduction to vi editor, modes in vi editor, common vi editor commands for open a file, save a file, delete a file, quit a file etc

Unit IV:

(10Lectures)

Shell Programming: Introduction to Linux Shell and Shell Scripting, types of shells in Linux, steps in creating a shell script, write and run shell scripts, shell variables and printing.

Unit-V

(10Lectures)

Shell programming arrays: deleting shell variables, script permissions and names, scripting guidelines, adding shell comments, shell variables, constants, operators, conditional statements, looping statements, using arrays, shell functions, files, shell built-in functions

CORE TEXTS

1. Christopher Negus, *Red Hat Linux 9 Bible*, WILEY-Dreamtech, New Delhi,
2. Thomas Schenk, *Red Hat Linux System Administration*, Techmedia, New Delhi, 2003

ADDITIONAL REFERENCES

- https://www.tutorialspoint.com/unix/shell_scripting.htm

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FREE AND OPEN SOURCE LAB:

1. Content Management System (CMS) Customization:
2. Customize a popular FOSS CMS (e.g., WordPress, Joomla, Drupal) to meet specific requirements for a website or web application.
3. Modify themes, plugins, and functionality to tailor the CMS to the needs of a particular organization or project.
4. E-commerce Platform Extension:
5. Extend an existing FOSS e-commerce platform (e.g., WooCommerce, Magento, OpenCart) with custom features or integrations.
6. Develop new payment gateways, shipping methods, product types, or marketing tools to enhance the platform's functionality.
7. Educational Software Development:
8. Develop FOSS educational software for teaching and learning purposes, such as interactive simulations, programming environments, or digital textbooks.
9. Collaborate with educators and subject matter experts to design and implement educational tools that address specific learning objectives.
10. Healthcare Information System Enhancement:
11. Contribute to the development and improvement of FOSS healthcare information systems (e.g., OpenMRS, GNU Health) by implementing new modules, features, or integrations.
12. Address usability, interoperability, and security issues to enhance the usability and effectiveness of the healthcare software.
13. GIS (Geographic Information System) Application Development:
14. Develop FOSS GIS applications or plugins for spatial data analysis, visualization, and mapping.
15. Implement features such as geocoding, routing, spatial analysis algorithms, and custom map layers to support geographic data processing tasks.
16. Scientific Computing Library Expansion:
17. Extend existing FOSS scientific computing libraries (e.g., NumPy, SciPy, matplotlib) with new algorithms, data structures, or optimization techniques.
18. Contribute to community-driven projects to improve performance, reliability, and usability of scientific computing tools.
19. Collaborative Text Editor Integration:
20. Integrate a FOSS collaborative text editor (e.g., Etherpad, OnlyOffice, CKEditor) with other tools or platforms for document collaboration and editing.
21. Develop plugins, connectors, or APIs to enable seamless integration with project management systems, content .

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- 22.repositories, or communication tools.
- 23.Community Engagement Platform Development:
- 24.Build a FOSS community engagement platform for managing discussions, contributions, and interactions within open source projects or organizations.
- 25.Implement features such as forums, mailing lists, issue trackers, and contributor recognition tools to foster collaboration and communication.
- 26.Accessibility Tool Enhancement:
- 27.Contribute to FOSS accessibility tools (e.g., screen readers, magnifiers, voice recognition software) by improving usability, compatibility, and functionality.
- 28.Address accessibility barriers and compliance requirements to make software applications more inclusive and accessible to users with disabilities.
- 29.Data Visualization Toolkit Expansion:
- 30.Extend FOSS data visualization libraries (e.g., D3.js, Plotly, Vega) with new chart types, interactive features, or data processing capabilities.
- 31.Develop plugins, extensions, or templates to simplify the creation of data-driven visualizations for web applications, dashboards, and reports.

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BBIT0802T: MOBILE APPLICATION DEVELOPMENT

Unit 1: Introduction to Mobile Application Development:- Overview of mobile platforms: iOS, Android, cross-platform development, Introduction to mobile development frameworks: Swift for iOS, Kotlin/Java for Android, React Native, Flutter, Setting up development environments: Xcode for iOS, Android Studio for Android, IDEs for cross-platform development.

Unit 2: User Interface Design for Mobile Applications:- Principles of mobile UI/UX design: simplicity, consistency, responsiveness, Mobile UI components: layouts, views, controls, navigation patterns, Designing adaptive layouts for different screen sizes and orientations, Implementing UI design using Interface Builder (iOS) and XML layout files (Android).

Unit 3: Mobile Application Development Basics:- Introduction to mobile development concepts: activities (Android), view controllers (iOS), state management,

Working with user input: handling touch events, gestures, text input, Data persistence: storing data locally (SQLite, SharedPreferences, Core Data), accessing remote data (RESTful APIs).

Unit 4: Advanced Mobile Application Development Topics:- Multi-screen navigation: navigation controllers (iOS), fragments (Android), routing (React Native, Flutter), Integrating device features: camera, GPS, accelerometer, sensors, Authentication and security: user authentication, authorization, encryption, secure communication.

Unit 5: Mobile Application Deployment and Distribution:- App deployment process: app store submission guidelines, provisioning profiles (iOS), signing keys (Android), Testing and debugging mobile applications: unit testing, UI testing, device testing, beta testing, App distribution channels: app stores (Apple App Store, Google Play Store), enterprise ,distribution, over-the-air (OTA) updates.

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Recommended Book:

"Programming Mobile Applications for Android and iOS" by O'Reilly Media. This book provides a comprehensive introduction to mobile application development for both Android and iOS platforms. It covers essential concepts, best practices, and practical examples to help students learn mobile development techniques effectively. Additionally, "Flutter in Action" by Eric Windmill is a practical guide to building mobile applications with Flutter, Google's UI toolkit for . building natively compiled applications for mobile, web, and desktop from a single codebase.

MOBILE APPLICATION LAB:-

1. Fitness Tracking App:
2. Develop a mobile app that tracks users' fitness activities such as running, cycling, and workouts.
3. Implement features such as GPS tracking, activity logging, calorie counting, and goal setting.
4. Provide visualizations and progress tracking to motivate users and help them achieve their fitness goals.
5. Recipe Sharing and Meal Planning App:
6. Create a mobile app for sharing recipes, meal planning, and grocery shopping.
7. Allow users to browse and search for recipes, create meal plans, and generate shopping lists based on selected recipes.
8. Include features for saving favorite recipes, customizing meal plans, and sharing recipes with friends and family.
9. Language Learning App:
10. Develop a mobile app for learning languages through interactive lessons, quizzes, and vocabulary exercises.
11. Offer features such as flashcards, audio pronunciation, grammar explanations, and progress tracking.
12. Support multiple languages and customizable learning paths based on users' proficiency levels and learning goals.
13. Event Planning and Management App:
14. Build a mobile app for organizing and managing events such as parties, meetings, and conferences.
15. Allow users to create event invitations, send RSVPs, manage guest lists, and track event details and schedules.
16. Provide features for event discovery, location mapping, reminders, and real-time communication among attendees.
17. Task Management and Productivity App:
18. Create a mobile app for organizing tasks, setting reminders, and improving productivity.
19. Implement features such as task lists, deadlines, priority levels, and task categorization.
20. Offer integration with calendar apps, notification reminders, and synchronization across multiple devices.

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BBIT0101D-T Digital marketing analysis

UNIT 1: DIGITAL MEDIA AND ANAL

Digital media types – Owned and earned social metrics – Paid searches and Organic Searches - Aligning Digital and Traditional Analytics – Identifying social media listening tools – Understanding social media engagement software – Social media engagement tools.

UNIT 2: TOOLS FOR DIGITAL ANALYTICS

Social Media Listening Tools - Evolution, Social analytics life cycle, Social media monitoring software: Sysomos, Radian6, Visible Technologies, Zoho social and others. Search Analytics Tools – Basics of search, Search analytics use cases, Search data, Google trends, YouTube trends, Google Adwords keyword, Yahoo clues, Collecting insights through search data.

Audience Analysis Tools – Audience Analysis Use Cases, Audience analysis tool types – Audience analysis Techniques, Event Triggers. Content Analysis Tools - Content Audits- Optimizing Content Distribution, Analysing Content Consumption. Engagement Analysis Tools–Social Media Engagement Software (SMES), using SMES, study of different SMES in the market.

UNIT 3: DIGITAL INFLUENCE AND LISTENING

Reality of Digital Influence - Media List - Klout, PeerIndex - Online Versus Offline Influence - Using the Influencer List - Developing Social Media Listening Program - Using Listening Data for Program Planning - Implementing Listening Program - Conversation Audit - Online Influencers - Conducting Social brand benchmarking - Use of Online data for crisis anticipation-Identifying known issues - Crisis day monitoring and ongoing reporting - Corrections after crisis - Improving customer service – Social customer service conflict - Social customer service models.

UNIT 4: RESEARCH PLAN AND SEARCH ANALYSIS

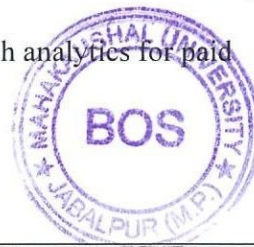
Launching new product – Product life cycle – Introduction Phase – Growth Phase – Maturity Phase.

Formulating research plan – Developing source list – Research methods – Constructing reports –

Delivering reports – Report use cases – Building central repository of information – Search analytics for digital strategy – Search analytics for content strategy and planning – Search analytics for paid advertising.

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UNIT 5: ROI, MOBILE ANAYTICS AND BUSINESS INTELLIGENCE

Return on Investment (ROI) – Return on Engagement, Influence, Experience – Tracking ROI

Understanding measurement fundamentals – Measurement reporting cadence - Mobile Analytics –

Mobile market landscape – Mobile marketing measurement – Marketing activities – Audience/visitor

metric – Mobile app performance - Social CRM – Social CRM initiative – Social CRM Initiative –

Future of Digital Data – Business Intelligence.

TEXT BOOKS:

1.Chuck Hemann and Ken Burbary, “Digital Marketing Analytics: Making Sense of Consumer Data in a Digital World”, Que Publishing, 2nd edition, 2018.

REFERENCE BOOKS:

1.Simon Kingsnorth, “Digital Marketing Strategy: An Integrated Approach Marketing”, Kogan Page Publisher, First edition, ISBN-13: 978-0749474706, 2016.

2.Dave Chaffey, Fiona Ellis-Chadwick, “Digital Marketing – Strategy, Implementation and Practice”, Pearson Education, Sixth edition, ISBN-13: 978-1292077611, 2016.

E BOOKS

1.Eric Enge, Andy Crestodina, Larry Kim, Steve Rayson and Chad White, “How the Pros Turn Marketing Analytics Into Effective Marketing Strategies”, Alexa, An Amazon Company.
<https://blog.alexa.com/wp-content/uploads/2016/12/How-to-Pros-Turn-Marketing-Analytics-into-Effective-Marketing-Strategies-ebook.pdf>

MOOC

1.<https://www.coursera.org/learn/marketing-analytic>

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BBIT0102D-T :CLOUD SERVICES FOR IOT

Unit I CLOUD PLATFORM ARCHITECTURE AND SERVICES

Cloud computing and service models: Public, Private and Hybrid clouds-Infrastructure as a service(IaaS)-Platform as a service(PaaS)-Software as a service(SaaS)-Architectural design of compute and storage clouds: Layered cloud architectural development-Architectural design challenges-Public cloud platforms: GAE,AWS and Azure.

Unit II PROGRAMMING IOT DEVICES FOR CLOUD INTERFACE

Basics of Sensors and actuators – examples and working principles of sensors and actuators – Cloud computing and IOT – Arduino/Equivalent Microcontroller platform. IoT Communication Technologies – RFID – Bluetooth – Zigbee – Wifi –Wired Communication.

Unit III CLOUD PLATFORMS FOR IOT

Thinkspeak IoT Cloud Platform, Kaa Open Source Iot Cloud Platform, AWS IoT Cloud Platform –AWS IoT Device SDK. Arduino AWS IoT development. Raspberry Pi 3-AWS IoT development.

Unit IV CLOUD SERVICES FOR IOT

Service Management in Cloud Computing - Service Level Agreements (SLAs), Managing IoT Data – Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing.

Unit V SECURITY AND APPLICATIONS

Application Safety and Service Vulnerability in Cloud Network- IoT Security and Privacy Preservation- Security and Challenges in Mobile Cloud Computing-The vital role of Fog computing in Internet of Things.

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TEXT BOOKS:

- 1.Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From parallel processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012.
- 2.Raj Kamal, “Internet of Things: Architecture and Design Principles”, McGraw-Hill Education Pvt. Ltd., 2018.
- 3.Charalampos Doukas, “Building Internet of Things with the Arduino”, Create Space, April 2002.
- 4.Agus Kurniawan “Learning AWS IoT”Packt Publishing (January 29, 2018)

REFERENCE BOOKS:

- 1.Dac-Nhuong Le , Chintan Bhatt , Mani Madhukar “Security Designs for the Cloud, IoT, and Social Networking” John Wiley & Sons (11 October 2019)
- 2.Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press, 2013.
- 3.Marco Schwatz, “Internet of Things with Arduino Cookbook”, Packt Publications, 2016.
4. Rajkumar Buyya, Christian Vecchiola. S.ThamaraiSelvi, “Mastering Cloud Computing”, McGraw Hill Education, 2013.
5. Nick Antonopoulos and Lee Gillam, “Cloud Computing: Principles, Systems and Applications”, Second Edition, Springer, 2017.

Extensive Reading:

- 1.<https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/> 2.<https://aws.amazon.com/iot/>
- 3.<http://postscapes.com/projects>
- 4.<http://www.theinternetofthings.eu/what-is-the-internet-of-things>
- 5.<https://www.theinternetofthings.eu/digital-world-iot>
- 6.<https://cloud.google.com/solutions/iot>
- 7.https://swayam.gov.in/nd1_noc20_cs20



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BBIT0103D-T: Augmented reality & virtual reality

UNIT I INTRODUCTION

The three I's of virtual reality-commercial VR technology and the five classic components of a VR system - Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation-interfaces and gesture interfaces-Output Devices: Graphics displays-sound displays & haptic feedback.

UNIT II VR DEVELOPMENT PROCESS

Geometric modeling - kinematics modeling- physical modeling - behaviour modeling - model Management.

UNIT III CONTENT CREATION CONSIDERATIONS FOR VR

Methodology and terminology-user performance studies-VR health and safety issues-Usability of virtual reality system- cyber sickness -side effects of exposures to virtual reality environment.

UNIT IV VR ON THE WEB & VR ON THE MOBILE

JS-pros and cons-building blocks (WebVR, WebGL, Three.js, device orientation events)- frameworks (A-frame, React VR)-Google VR for Android-Scripts, mobile device configuration, building to android-cameras and interaction-teleporting-spatial audio-Assessing human parameters-device development and drivers-Design Haptics.

UNIT V AONPPLICATIS

Medical applications-military applications-robotics applications- Advanced Real time Tracking other applications- games, movies, simulations, therapy.

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TEXT BOOKS:

- 1.C. Burdea & Philippe Coiffet, “Virtual Reality Technology”, Second Edition, Gregory, John Wiley & Sons, Inc.,2008
2. Jason Jerald. 2015. The VR Book: Human-Centred Design for Virtual Reality. Association for Computing Machinery and Morgan & Claypool, New York, NY, USA.

REFERENCE BOOKS:

- 1.Augmented Reality: Principles and Practice (Usability) by Dieter Schmalstieg & Tobias Hollerer, Pearson Education (US), Addison-Wesley Educational Publishers Inc, New Jersey, United States, 2016. ISBN: 9780321883575
- 2.Practical Augmented Reality: A Guide to the Technologies, Applications, and Human Factors for AR and VR (Usability),Steve Aukstakalnis, Addison-Wesley Professional; 1 edition, 2016.
- 3.The Fourth Transformation: How Augmented Reality & Artificial Intelligence Will Change Everything, Robert Scoble & Shel Israel, Patrick Brewster Press; 1 edition, 2016.
- 4.Learning Virtual Reality: Developing Immersive Experiences and Applications for Desktop, Web, and Mobile, Tony Parisi, O'Reilly Media; 1 edition, 2015.
5. Programming 3D Applications with HTML5 and WebGL: 3D Animation and Visualizationfor Web Pages, Tony Parisi, O'Reilly Media; 1 edition, 2014.
6. Learning Three.js: The JavaScript 3D Library for WebGL - Second Edition, Jos Dirksen,Packt Publishing - ebooks Account; 2nd Revised ed. Edition 2015.

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BBIT0104D-T Mobile Computing

Unit 1: Introduction to Mobile Computing:-Overview of mobile computing: definition, history, evolution, and significance, Mobile computing architecture: mobile devices, communication networks, middleware, and applications, Mobile operating systems: iOS, Android, Windows Mobile, and others, Mobile application development frameworks: native, web-based, and hybrid approaches.

Unit 2: Mobile Networking and Communication:-Wireless communication technologies: GSM, CDMA, LTE, Wi-Fi, Bluetooth, NFC, Mobile network architectures: cellular networks, ad hoc networks, satellite networks, Mobile IP (IPv4 and IPv6): addressing, routing, and mobility management, Mobile communication protocols: TCP, UDP, HTTP, SMS, MMS.

Unit 3: Mobile Application Development:-Principles of mobile application development: user interface design, responsiveness, power efficiency, Mobile application development frameworks: Android SDK, iOS SDK, Xamarin, React Native, User interface design patterns: navigation patterns, layout design, responsive design, Mobile application testing and debugging: unit testing, UI testing, device testing, emulation, and simulation.

Unit 4: Location-Based Services and Mobile Commerce:-Location-based services (LBS): GPS, A-GPS, location sensing techniques, Mobile commerce (m-commerce): mobile payment systems, mobile banking, mobile shopping, Mobile advertising and location-based marketing: targeted advertising, proximity marketing, Security and privacy issues in location-based services and mobile commerce.

Unit 5: Mobile Security and Privacy:-Mobile device security: device encryption, screen lock, biometric authentication, Mobile application security: secure coding practices, data encryption, secure communication, Mobile malware and vulnerabilities: types of mobile threats, prevention techniques, Privacy concerns in mobile computing: data collection, tracking, consent, and regulation.

Recommended Book: "Mobile Computing" by Raj Kamal. This book provides a comprehensive overview of mobile computing concepts, technologies, and applications. It covers topics such as mobile communication systems, mobile computing architecture, mobile application development, location-based services, mobile security, and privacy. With clear explanations and real-world examples, it serves as a valuable resource for students and practitioners interested in mobile computing.

BBIT0105D-T Statistics and Data Analytics

Unit 1: Introduction to Statistics and Data Analysis:-Basic concepts in statistics: population vs. sample, descriptive vs. inferential statistics, Data types: qualitative vs. quantitative data,

Data visualization techniques: histograms, scatter plots, box plots, etc. Summary statistics: mean, median, mode, variance, standard deviation.

Unit 2: Probability Theory:-Fundamentals of probability: sample spaces, events, probability axioms, Conditional probability and independence, Random variables and probability distributions: discrete and continuous distributions, Expected value and variance.

Unit 3: Statistical Inference:-Estimation: point estimation, interval estimation, Hypothesis testing: null and alternative hypotheses, Type I and Type II errors, significance level, p-value Parametric and non-parametric tests, Confidence intervals and hypothesis tests for means, proportions, variances, etc.

Unit 4: Regression Analysis:-Simple linear regression: model, estimation, inference, diagnostics, Multiple linear regression: model, estimation, inference, diagnostics Regression assumptions and violations, Model selection techniques: forward selection, backward elimination, etc.

Unit 5: Data Analytics and Machine Learning:-Introduction to data analytics process: data preparation, exploratory data analysis (EDA), modeling, evaluation, deployment,

Supervised learning techniques: classification, regression, Unsupervised learning techniques: clustering, dimensionality reduction, Introduction to popular machine learning algorithms: decision trees, random forests, support vector machines (SVM), k-nearest neighbors (k-NN), etc.

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Reference Book:

"Statistics for Business and Economics" by Paul Newbold, William L. Carlson, and Betty Thorne,
"Probability and Statistics for Engineering and the Sciences" by Jay L. Devore, "Statistical Inference" by
George Casella and Roger L. Berger, "An Introduction to Statistical Learning: with Applications in R"
by Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani, "Python for Data Analysis" by
Wes McKinney

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BBIT0106D-T : Cyber forensic analytics

UNIT 1: CYBER CRIME

Cyber Space – Cyber Crime – Criminal Behaviour – Jurisdictional Concerns - Jurisprudential Inconsistency – eCash Security – Prepaid Cards – Stored Values Cards – Mobile Payments – Internet Payment Services - Cyber stalking - Cyber extortion – Cyber terrorism - Cyber warfare –Cyber weapons -ATM frauds – Phreaking – Internet Gambling.

UNIT 2: CYBER FORENSICS

Digital device – Hard disk –Disk characteristics - Disk imaging - Data Carving – Techniques – commercial piracy - soft lifting – Steganography – Network components - Port scans - Wireshark – pcap. analysis - Trojans and Backdoors – Botnets - DoS – DDoS Attacks - Honey Pots – Malware – Virus and Worms.

UNIT 3: CYBER INVESTIGATION

Concepts of Investigation - cyber investigation, Network Investigation - Investigating audit logs - Investigating Web attacks - Investigating Computer Intrusions - Profiling – Cyber Criminal profiling – Stylometric Techniques – Warranted searches – Warrantless searches – Undercover Techniques

UNIT 4: EVIDENCE MANAGEMENT

Evidence – Digital Evidence - Types – physical evidence – Real evidence – Circumstantial evidence – network evidence - Evidence collection – Evidence Analysis - Contextual Information –Evidence Management – pre search activities – On Scene activities – Report Preparations

UNIT 5: CYBER LAWS AND AUTHORITIES

Information Technology Act 2000 – Digital signature - Electronic Governance - Secure electronic records - Regulation of certifying authorities – CERNTin - Electronic signature certificates – Penalties compensation - Future Trends and Emerging Concerns.

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TEXT BOOKS:

1. Marjie T. Britz, "Computer Forensics and Cyber Crime", Pearson, 2013.
2. Garima Tiwari, "Understanding Laws– Cyber Laws And Cyber Crimes", Lexis Nexis, 2014.

REFERENCE BOOKS:

1. Chuck Easttom, Jeff Taylor, "Computer Crime, Investigation, and the Law", Course Technology, 2018.
2. Eoghan Casey, "Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet", Eoghan Casey, 2018.

E-BOOK

- 1 <http://index-of.es/Miscellaneous/LIVRES/Syngress.Cyber.May.2014.ISBN.0128007435.pdf>
2. <http://index-of.es/Miscellaneous/LIVRES/Syngress.Cyber.May.2014.ISBN.0128007435.pdf>

MOOC

1. <https://www.coursera.org/lecture/cyber-conflicts/introduction-to-cybercrime-and-fundamentalissues-xndSq>.

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BBIT0107D-T: Social Network Analytics

UNIT I SOCIAL NETWORK ANALYSIS

Network analysis- Development of Social network analysis- Key concepts and measures in network analysis -The global structure of networks - The macro-structure of social networks - Personal networks.

UNIT II WEB SEMANTICS IN SOCIAL NETWORK APPLICATIONS

Electronic sources for network analysis - Electronic discussion networks - Blogs and online communities- Web-based networks - Knowledge Representation on the Semantic Web - Ontologies and their role in the Semantic Web Ontology languages for the Semantic Web - The Resource Description Framework.(RDF)and RDF Schema - The Web Ontology Language (OWL) - Comparison to the Unified Modelling Language (UML) - Comparison to the Entity/Relationship (E/R) model and the relational model - Comparison to the Extensible Markup Language (XML) and XML Schema.

UNIT III MODELLING AND AGGREGATING SOCIAL NETWORK DATA

State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Representing identity - On the notion of equality - Determining equality - Reasoning with instance equality - Evaluating smushing.

UNIT IV DEVELOPING SOCIAL-SEMANTIC APPLICATIONS

Building Semantic Web applications with social network features - The generic architecture of Semantic Web applications -Sesame – Elmo – GraphUtil - The features of Flink - System design – open academia: distributed, semantic-based publication management - The features of open academia - System design.

UNIT V EVALUATION OF SOCIAL NETWORK ANALYSIS

Evaluation of web-based social network extraction - Data collection - Preparing the data – Optimizing goodness of fit - Comparison across methods and networks - Predicting the goodness of fit – Evaluation

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through analysis - Semantic-based Social Network Analysis in the sciences - Data acquisition - Representation, storage and reasoning- Visualization and Analysis – Results - Descriptive analysis - Structural and cognitive effects on scientific performance .

TEXT BOOKS:

1. Peter Mika , Social Networks and the Semantics Web”, Springer, 2007

REFERENCE BOOKS

1. Borko Furht, “Handbook of Social Network Technologies and Applications”, 1st Edition, Springer, 2010.

E-BOOK

1. [http://www.asecib.ase.ro/mps/Social%20Networks%20and%20the%20Semantic%20Web%20\[2007\].pdf](http://www.asecib.ase.ro/mps/Social%20Networks%20and%20the%20Semantic%20Web%20[2007].pdf)

MOOC

1. <https://www.coursera.org/learn/social-network-analysis>.

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BBIT0108D-T: High Dimensional

UNIT 1: CLASSICAL METHODS

Classical method- Multi variant and High dimensional problems – Visualization – Multi variant Randomvector and data- Multi dimensional data

UNIT 2: DISCRIMINANT ANALYSIS

Visualizing principal component analysis – Properties of principal component - Standardized data and high dimensional data - Asymptotic results - Number of components and regression – Canonical correlation analysis -Population - sample and properties of canonical correlation, Asymptotic consideration - Canonical correlation and regression.

UNIT 3: FACTORS AND GROUPING

Norms proximities, features, and dualities - Vectors and matrix norms, measure of proximity – Features and feature maps, dualities of X and X Transpose - Cluster analysis - Hierarchal agglomerative clusters - 3k means clustering, -Principal component and cluster analysis- Factor Analysis, population k factor model - Sample k factor model - Multidimensional scaling, classical scaling, metric scaling and nonmetric scaling.

UNIT 4:NON-GUASSIAN ANALYSIS

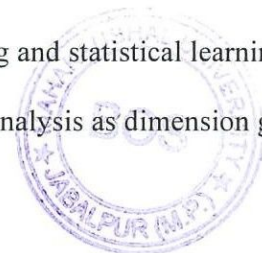
Factor Analysis - Population k factor model – Sample k factor model - Multidimensional scaling – Towards non Gaussianity - Independent component Analysis -Projection pursuit -Kernal and more independent component methods.

UNIT 5: FEATURE SELECTION

Introduction-Independent component and feature selection -Variable Ranking and statistical learning - Sparse principle component analysis – Consistency of principle component analysis as dimension grows.

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TEXT BOOKS:

1. Inge Koch, "Analysis of Multivariate and High-Dimensional Data", Cambridge University Press, 2014.

REFERENCE BOOKS:

1. Fatemeh Emdad, Seyed Zekavat, "High Dimensional Data Analysis: Overview, Analysis, and Applications, VDM Verlag, 2008

E-BOOK

- 1 <https://www.cambridge.org/core/books/analysis-of-multivariate-and-highdimensionaldata/2BF8DE949E18E3A68001976784087816>

MOOC

1. <https://www.edx.org/course/high-dimensional-data-analysis>.

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Skill Based: Skill Enhancement Courses

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BBIT0101SB-T: Internet of Things**Unit-I****(10Lectures)**

Introduction – Definition and Characteristics of IoT, Physical Design of IoT; Things in IOT, Logical Design of IoT; IoT Functional Blocks, IoT Communication APIs, IoT Enabling Technologies; WSN, Cloud Computing, Big Data Analysis, Communication Protocols, Embedded Systems.

Unit-II**(10Lectures)**

(14Lectures) IoT Hardware, Devices and Platforms – Basics of Arduino Hardware, The Arduino IDE, Basic Arduino Programming, Basics of Raspberry pi; Introduction to Raspberry pi, Programming with Raspberry pi, C DAC IoT devices: Ubimote, WiFimote, BLE Mote, WINGZ gateway, Introduction to IoT Platforms, IoT Sensors and actuators.

Unit-III**(14Lectures)**

IoT Protocols – IoT Data link Protocols, Network Layer Routing Protocols, Network Layer Encapsulation Protocols, Session Layer Protocols, IoT Security Protocols, Service Discovery Protocols, Infrastructure Protocols.

Unit-IV**(12Lectures)**

IoT Programming – Arduino Programming: Serial Communications – Getting Input from Sensors, Visual, Physical and Audio Outputs, Remotely Controlling External Devices, Wireless Communication, Programming with Raspberry pi: Basics of python Programming, Python Packages of IoT, IoT Programming with CADC IoT devices.

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Unit-V**(10Lectures)**

Domain Specific IoT – Home automation, smart cities, Smart Environment, IoT in Energy, Logistics, Agriculture, industry and Health & Lifestyle sensors, Case Studies: A Case Study of Internet of Things Using Wireless Sensor Networks and Smart Phones, Security Analysis of Internet-of-Things: A Case Study of August Smart Lock, Open IoT Platform

Reference Books:

- Vijay Madisetti and Arshdeep Bahga, —Internet of Things (A Hands-on Approach) II, 1st Edition, VPT, 2014.
- Margolis, Michael. —Arduino Cookbook: Recipes to begin, Expand and Enhance Your Projects II. O'Reilly Media Inc. 2011.
- Monk, Simon. Raspberry Pi Cookbook: Software and hardware problems and Solutions. O'Reilly Media, Inc. 2016.
- https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
- https://onlinecourses.swayam2.ac.in/arp19_ap79/preview



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BBIT0102SB-T: Ethical Hacking

Unit-I

(14Lectures)

Introduction to Hacking – Importance of Security – Elements of Security – Phases of an Attack – Types of Hacker Attacks – Hacktivism – Vulnerability Research – Introduction to Footprinting – Information Gathering Methodology – Footprinting Tools – WHOIS Tools – DNS Information Tools – Locating the Network Range – Meta Search Engines.

Unit-II

(10Lectures)

Introduction to Scanning – Objectives – Scanning Methodology – Tools Introduction to Enumeration – Enumeration Techniques – Enumeration Procedure – Tools.

Unit-III

(14Lectures)

Introduction – Cracking Passwords – Password Cracking Websites – Password Guessing – Password Cracking Tools – Password Cracking Countermeasures – Escalating Privileges – Executing Applications – Keyloggers and Spyware.

Unit-IV

(12Lectures)

Programming Fundamentals – C language – HTML – Perl – Windows OS Vulnerabilities – Tools for Identifying Vulnerabilities – Countermeasures – Linux OS Vulnerabilities – Tools for Identifying Vulnerabilities – Countermeasures.

Unit-V

(10Lectures)

Introduction – Security Assessments – Types of Penetration Testing – Phases of Penetration Testing – Tools – Choosing Different Types of Pen-Test Tools – Penetration Testing Tools.

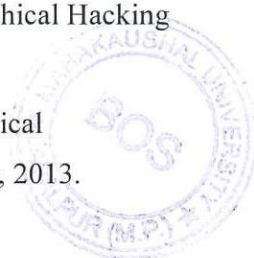
Reference Books:

- ECCouncil, —Ethical Hacking and Countermeasures: Attack Phases I, Cengage Learning, 2010.
- Jon Erickson, —Hacking, 2nd Edition: The Art of Exploitation II, No Starch Press Inc., 2008.
- Michael T. Simpson, Kent Backman, James E. Corley, —Hands-On Ethical Hacking and Network Defense I, Cengage Learning, 2013.
- Patrick Engebretson, —The Basics of Hacking and Penetration Testing – Ethical Hacking and Penetration Testing Made Easy I, Second Edition, Elsevier, 2013.

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- RafayBoloach,—EthicalHackingandPenetrationTestingGuidel,CRCPress,2014
- https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
https://onlinecourses.swayam2.ac.in/arp19_ap79/preview

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BBIT0103SB-T: Predictive modeling analysis

UNIT I: DATA PREPARTION

(16Lectures)

Introduction – Predictive Analytics in the Wild – Exploring Data types and associated Techniques - Complexities of data - Applying Models: Models and simulation, Categorizing Models, Describing, summarizing data, and decisions – Identify similarities in Data: Data Clustering, converting Raw Data into a Matrix, Identify K-groups in Data

UNIT II: DATA CLASSIFICATION – PART I

(11Lectures)

Background – Exploring Data classification process - Using Data Classification to predict the future: Decision tree, Algorithm for generating Decision Trees, Support Vector Machine.

UNIT III: DATA CLASSIFICATION – PART II

(11Lectures)

Ensemble Methods to Boost Prediction Accuracy: Naive Bayes Classification Algorithm, The Markov Model, Linear Regression, Neural Networks – Deep learning.

UNIT IV: DATA PREDICTION

(11Lectures)

Adopt predictive analytics - Processing data: identifying, cleaning, generating, reducing dimensionality of data – Structuring Data – Build predictive model: develop and test the model.

UNIT V: DATA VISUALIZATION

(11Lectures)

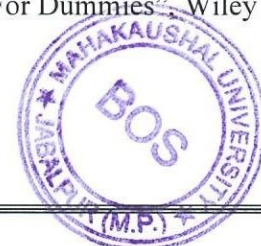
Introduction to visualization tool – Evaluate the data – visualize Model's Analytical Results: hidden grouping, data classification results, outliers, decision trees, prediction – Novel visualization in Predictive Analytics.

TEXT BOOKS

1. Anasse Bari, Mohamed Chaouchi, Tommy Jung, "Predictive Analytics For Dummies". Wiley Publisher, 2nd Edition, 2016.

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REFERENCE BOOKS

1. Bertt Lantz, Machine Learning with R: Expert techniques for predictive modeling to solve all your data analysis problems, Pack Publisher, 2nd Edition, 2015.
2. Aurelien, "Hands-On Machine Learning with Scikit-Learn & TensorFlow", O'Reilly Publisher, 5th Edition, 2017.
3. Max Kuhn, Kjell Johnson, "Applied Predictive Modeling" Springer, 2013.

E BOOKS

1. https://vuquangnguyen2016.files.wordpress.com/2018/03/applied-predictive-modeling-maxkuhn-kjell-johnson_1518.pdf
2. https://www.researchgate.net/publication/329873035_Prediction_Modeling_Methodology
3. <https://www.memsql.com/releases/oreilly-predictive-analytics/>

MOOC

1. <https://www.coursera.org/learn/predictive-modeling-analytics>
2. <https://www.edx.org/course/predictive-analytics>.

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BBIT0104SB-T : Social Network analytics

UNIT I SOCIAL NETWORK ANALYSIS

(11Lectures)

Network analysis- Development of Social network analysis- Key concepts and measures in network analysis
-The global structure of networks - The macro-structure of social networks - Personal networks..

UNIT II WEB SEMANTICS IN SOCIAL NETWORK APPLICATIONS

(11Lectures)

Electronic sources for network analysis - Electronic discussion networks - Blogs and online communities
- Web-based networks - Knowledge Representation on the Semantic Web - Ontologies and their role in the

Semantic Web Ontology languages for the Semantic Web - The Resource Description Framework.

(RDF) and RDF Schema - The Web Ontology Language (OWL) - Comparison to the Unified Modelling

Language (UML) - Comparison to the Entity/Relationship (E/R) model and the relational model -

Comparison to the Extensible Markup Language (XML) and XML Schema.

UNIT III MODELLING AND AGGREGATING SOCIAL NETWORK DATA

(11Lectures)

State-of-the-art in network data representation - Ontological representation of social individuals -

Ontological representation of social relationships - Aggregating and reasoning with social network data -

Representing identity - On the notion of equality - Determining equality - Reasoning with instance equality -

Evaluating smushing

UNIT IV DEVELOPING SOCIAL-SEMANTIC APPLICATIONS

(11Lectures)

Building Semantic Web applications with social network features - The generic architecture of Semantic

Web applications - Sesame – Elmo – GraphUtil - The features of Flink - System design – open academia:

distributed, semantic-based publication management - The features of open academia - System design.

UNIT V EVALUATION OF SOCIAL NETWORK ANALYSIS

(11Lectures)

Evaluation of web-based social network extraction - Data collection - Preparing the data – Optimizing

goodness of fit - Comparison across methods and networks - Predicting the goodness of fit – Evaluation

through analysis - Semantic-based Social Network Analysis in the sciences - Data acquisition -

Representation, storage and reasoning- Visualization and Analysis – Results - Descriptive analysis -

Structural and cognitive effects on scientific performance .

Kumud

Aakile

TEXT BOOKS

1. Peter Mika , Social Networks and the Semantics Web”, Springer, 2007

REFERENCE BOOKS

1. Borko Furht, “Handbook of Social Network Technologies and Applications”, 1st Edition, Springer, 2010.

E-BOOK

1. [http://www.asecib.ase.ro/mps/Social%20Networks%20and%20the%20Semantic%20Web%20\[2007\].pdf](http://www.asecib.ase.ro/mps/Social%20Networks%20and%20the%20Semantic%20Web%20[2007].pdf)

MOOC

1. <https://www.coursera.org/learn/social-network-analysis>.

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Kumar

Ashish



BBIT0105SB-T HIGH-DIMENSIONAL DATA ANALYSIS

UNIT 1: CLASSICAL METHODS

(10Lectures)

Classical method- Multi variant and High dimensional problems – Visualization – Multi variant Random vector and data- Multi dimensional data

UNIT 2: DISCRIMINANT ANALYSIS

(12Lectures)

Visualizing principal component analysis – Properties of principal component - Standardized data and high dimensional data - Asymptotic results - Number of components and regression – Canonical correlation analysis -Population - sample and properties of canonical correlation, Asymptotic consideration - Canonical correlation and regression.

UNIT 3: FACTORS AND GROUPING

(14Lectures)

Norms proximities, features, and dualities - Vectors and matrix norms, measure of proximity – Features and feature maps, dualities of X and X Transpose - Cluster analysis - Hierarchal agglomerative clusters - 3k means clustering, -Principal component and cluster analysis- Factor Analysis, population k factor model - Sample k factor model - Multidimensional scaling, classical scaling, metric scaling and nonmetric scaling.

MODULE 4:NON-GUASSIAN ANALYSIS

(12Lectures)

Factor Analysis - Population k factor model – Sample k factor model - Multidimensional scaling – Towards non Gaussianity - Independent component Analysis -Projection pursuit -Kernal and more independent component methods.

MODULE 5: FEATURE SELECTION

(12Lectures)

Introduction-Independent component and feature selection -Variable Ranking and statistical learning - Sparse principle component analysis – Consistency of principle component analysis as dimension grows.

TEXT BOOKS:

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1. Inge Koch , Analysis of Multivariate and High-Dimensional Data”, Cambridge University Press, 2014

REFERENCE BOOKS:

1. Fatemeh Emdad, Seyed Zekavat , “High Dimensional Data Analysis: Overview, Analysis, and Applications, VDM Verlag, 2008

E-BOOK:

1 <https://www.cambridge.org/core/books/analysis-of-multivariate-and-highdimensionaldata/2BF8DE949E18E3A68001976784087816>

MOOC:

1. <https://www.edx.org/course/high-dimensional-data-analysis>.


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Open Elective Compulsory

Course/Generic Elective Compulsory

Course



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OECC0101-T: Fundamental of Computer

UNIT I

Brief History of Development of Computers, Computer System Concept, Computer System

Characteristics, Capabilities and Limitations, Types of Computers-., Personal Computer (PCs) - IBM PCs, Types of PCs- Desktop, Laptop, Notebook, Palmtop, etc. Basic Components of a Computer System- Control Unit, ALU, Input/Output semiconductor Memory. Storage fundamentals - Primary Vs Secondary memory.

UNIT II

Input Devices : Keyboard, Mouse, Joystick, Scanners, Digital Camera, MICR, OCR, OMR, , Light pen, TouchScreen. Output Devices Monitors - Characteristics and types of monitor, Size, Resolution, Refresh Rate, Dot Pitch, Video Standard - VGA, SVGA, XGA etc. Printers - Daisy wheel, Dot Matrix, Inkjet, Laser. Plotter, Sound Card and. Speakers.

UNIT III

Various Storage Devices - Magnetic Disks, Hard Disk Drives, Floppy, Disks, Optical Disks, Computer Software, Need, Types of Software's - System software, Application software System Software - Operating System, compiler, Assemblers, Interpreter .

UNIT IV

Operating Systems – Functions , Types- Batch, Single, Multiprogramming, Multiprocessing Programming languages- Machine, Assembly, High Level, 4GL, Application Software - Word-processing, Spreadsheet, Presentation Graphics, Data Base Management Software, Number System, Number System of computers- Binary, Octal, Hexadecimal, their conversion. Coding System – ASCII, EBCDIC.

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UNIT V

Direction of Transmissions Flow-Simplex, Half Duplex Full Duplex, Types of Network - LAN, WAN, MAN etc. Topologies of LAN- Ring, Bus, Star, Mesh and Tree topologies. Computer Virus: Virus working principals, Types of viruses, Virus detection and Prevention Viruses on network.

TEXT & REFERENCE BOOKS :

COMPUTERS TODAY BY S.K. BASANDRA, GALGOTIA PUBLICATIONS.

FUNDAMENTALS OF INFORMATION TECHNOLOGY BY ALEXIS LEON & MATHEWS LEON,
VIKAS PUBLISHING HOUSE, NEW DELHI.

DOS QUICK REFERENCE BY RAJEEV MATHUR, GALGOTIA PUBLICATIONS.

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