

Mahakaushal University, Jabalpur (M.P.)



Scheme & Syllabus

For

B.S.C (AIML) with Research/honors

Faculty of Computer Science and
Applications

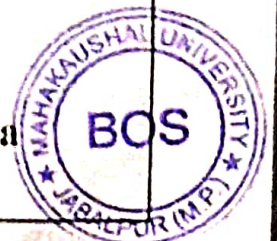
2022-23

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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BAIM0101T: 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.

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

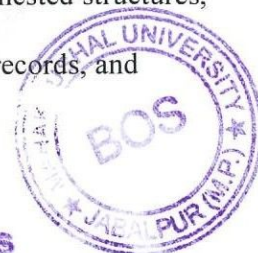
1. E. Balagurusamy – *Programming in ANSI C*, McGraw Hill
2. Brian W. Kernighan & Dennis M. Ritchie – *The C Programming Language*, PHI
3. Yashavant Kanetkar – *Let Us C*, BPB Publications
4. H. Schildt – *C: The Complete Reference*, McGraw Hill
5. K. N. King – *C Programming: A Modern Approach*, W. 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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Unit-IV

(8Lectures)

Relational Database Design: Anomalies in a database, functional dependency, normal forms, lossless join and dependency, BCNF, normalization through synthesis, higher order normal forms. SQL- SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Specifying Constraints as Assertion and Trigger, Views (Virtual Tables) in SQL, Embedded SQL, Dynamic SQL.

Unit-V

(14Lectures)

Introduction to transaction processing, transaction and system concepts, desirable properties of transactions, transaction support in SQL. Concurrency control techniques: two phase locking techniques, concurrency control based on timestamp ordering. Recovery techniques: recovery concepts, recovery in multi-database systems, database backup and recovery from catastrophic failures.

Reference Books:

- Elmasri and Navathe: Fundamentals of Database Systems, 7th Edition, Addison-Wesley, 2016.
- Silberschatz, Korth and Sudharshan Database System Concepts, 7th Edition, Tata McGraw Hill, 2019
- C.J. Date, A. Kannan, S. Swamynathan: An Introduction to Database Systems, 8th Edition, Pearson Education, 2009.
- Database Management Systems: Raghu Ramakrishnan and Johannes Gehrke, 3rd Edition, McGraw Hill, 2003.

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b. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department

Program 6: Execute the following queries

- a. Retrieve the name of each employee controlled by Department number 5 (use EXIST operator).
- b. Retrieve the name of each department and number of employees working in each Department which has at least 2 employees

Program 7: Execute the following queries

- a. For each project, retrieve the project number, the project name, and the number of employees who work on that project. (use GROUP BY)
- b. Retrieve the name of employees who were born in the year 1990's

Program 8: For each Department that has more than five employees, retrieve the department number and number of employees who are making salary more than 40000.

Program 9: For each project on which more than two employees work, retrieve the project number, project name and the number of employees who work on that project.

Program 10: For a given set of relation tables perform the following: Creating Views (with and without check option), Dropping views, Selecting from a view

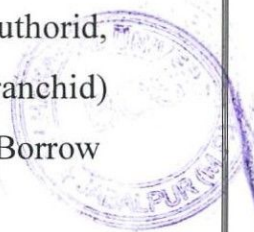
Program 11: Create the following tables with properly specifying Primary keys, Foreign keys.

and solve the following queries. BRANCH (Branchid, Branchname, HOD) STUDENT (USN, Name, Address, Branchid, sem) BOOK (Bookid, Bookname, Authorid, Publisher, Branchid)

AUTHOR (Authorid, Authorname, Country, age) BORROW (USN, Bookid, Borrowed_Date).

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Reference Books:

- Elmasri and Navathe: Fundamentals of Database Systems, 7th Edition, Addison- Wesley, 2016.
- Silberschatz, Korth and Sudharshan Database System Concepts, 7th Edition, Tata McGraw Hill, 2019
- C.J.Date, A.Kannan, S.Swamynatham: An Introduction to Database Systems, 8th Edition, Pearson education, 2009
- DBMS: Raghu Ramakrishnan and Johannes Gehrke:, 3rd Edition, McGraw Hill, 2003

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Text Books:

1. ObjectOrientedProgrammingwithC++ by E. Balagurusamy, McGraw-HillEducation(India)
2. ANSlandTurboC++ by AshokeN.Kamthane,PearsonEducation

Reference Books:

1. Big C++ -WileyIndia
2. C++: TheCompleteReference-Schildt,McGraw-HillEducation(India)
3. C++andObjectOrientedProgramming—Jana,PHILearning.
4. ObjectOrientedProgrammingwithC++ -RajivSahay,Oxford
5. MasteringC++ - Venugopal,McGraw-HillEducation(India)

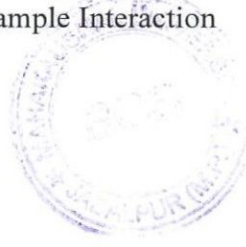
LIST OF PRACTICALS OF C++:-

1. WriteaProgramThatJustOutputs'HelloWorld
2. WriteaProgramtoFindMaximumandMinimumofGiven3Numbers.
3. WriteaProgramThatOutputValueasNumberandasCharacter.
4. ImplementationoftheFunctionThatCalculatestheCrossSumofanInteger.(123as1+2+3).
5. DetermineNumberofCharactersinaString.
6. Raising a Number N to a Power P is the Same as Multiplying N By Itself P Times. Write aFunction 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 isOmittedtheNumberWillBeSquared. WriteaMain()FunctionThatGetsValuesfromtheUser toTestThisFunction.
7. Write a C++ Program to Sort an Array of Integer in Ascending Order Using a Function CalledExchange()WhichAcceptsTwoIntegerArgumentsByReference.
8. WriteaC++ProgramtoImplementFunctionOverloadinginOrdertoCompute.
9. WriteaC++ProgramtoImplementPower(MN)Where
I) MisDoubleandNisInt II)MandNareInt.
10. Write a Program That Uses a Structure Called Point to Model a Point. Define Three Points andHave the User Input Values to Two of Them. Then Set the Third Point Equal to the Sum of theOther Two and Display the Value of the New Point. Interaction with the Program Might LookLikeThis:
EnterCoordinatesforP1:34
Enter Coordinates for P2: 5
7CoordinatesofP1+P2are:811
11. Create the Equivalent of a Four Function Calculator. the Program Should Request the User toEnter a Number an Operator and Another Number. It Should Then Carry Out the SpecifiedArithmetical Operation: Adding Subtracting Multiplying Or Dividing the Two Numbers. (ItShould 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 AnotherCalculation. the Response Can Be Y Or N. Some Sample Interaction with the Program MightlooklikeThis.

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BAIM0202T: DISCRETE MATHEMATICS

Unit I

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

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

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

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

Lattice theory: Lattices and algebras systems, principles of duality, basic properties of algebraic systems defined by lattices, distributive and complemented 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.

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)
3. B. Kalman: Discrete Mathematical Structure, 3rd edition, Chapter 11(11.1,11.2)



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Unit-V(16Lectures)

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–

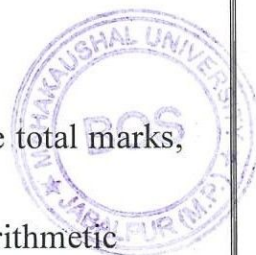
twokeyswingfeatures, components and containers, the swing packages, a simple swing application, event handling. Exploring Swing- JLabel, JTextField, JButton, Check boxes, Radio buttons, JList, JComboBox.

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, Java2- 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.

BAIM301P: 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)



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BAIM0302T :Introduction to Artificial Intelligence

Unit-II

Introduction to AI - Intelligent Agents, Problem-Solving Agents, Searching for Solutions - Breadth-first search, Depth-first search, Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces.

Unit-II

(14Lectures)

Games - Optimal Decisions in Games, Alpha-Beta Pruning, Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Knowledge-Based Agents, Logic Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses.

Unit-III

(12Lectures)

First-Order Logic - Syntax and Semantics of First-Order Logic, Using First Order Logic, Knowledge Engineering in First-Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification, Forward Chaining, Backward Chaining, Resolution. Knowledge Representation: Ontological Engineering, Categories and Objects, Events.

Unit-IV

(10Lectures)

Planning Definition of Classical Planning, Algorithms for Planning with State Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches. Hierarchical Planning.

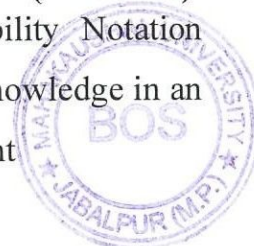
Unit-V

(14Lectures)

Probabilistic Reasoning: Acting under Uncertainty, Basic Probability Notation Bayes' Rule and Its Use, Probabilistic Reasoning, Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient

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:ArtificialIntelligence Lab:-

List ofExperiments:

- 1) Writeaprograminprologtoimplementsimplefacts and Queries
- 2) Writeaprograminprologtoimplementsimple arithmetic
- 3) WriteaprograminprologtosolveMonkeybanana problem
- 4) WriteaprograminprologtosolveTowerofHanoi
- 5) Writeaprograminprologtosolve8Puzzleproblems
- 6) Writeaprograminprologtosolve4-Queensproblem
- 7) WriteaprograminprologtosolveTravelingsalesman problem
- 8) WriteaprograminprologforWaterjugproblem

ListofExperiments (NLP)

1. WordAnalysis
2. WordGeneration
3. Morphology
4. N-Grams
5. N-GramsSmoothing

ReferenceBooks:

- Artificial Intelligence: A Modern Approach Third Edition Stuart Russell and Peter Norvig, 2010. Pearson Education, Inc. ISBN: 978-0-13-604259-4
- DanielJurafsky,JamesH.Martin—SpeechandLanguageProcessing:AnIntroduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.

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BAIM0401T :DIGITAL ELECTRONIC AND COMPUTER ORGANIZATION

UNIT-I

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

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

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

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

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 Semiconductor Memories Direct Memory Access (DMA) 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

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MNO, Jabalpur

BAIM0402T:Machine Learning Technique

Unit 1

Introduction to Machine Learning:-Overview of machine learning concepts and applications,Supervised, unsupervised, and semi-supervised learning,Model evaluation and performance metrics.

Unit 2

Supervised Learning Techniques:-Linear regression, Logistic regression,Decision trees and ensemble methods (Random Forests, Gradient Boosting).

Unit 3

Unsupervised Learning Techniques:-Clustering algorithms (K-means, hierarchical clustering), Dimensionality reduction techniques (PCA, t-SNE), Anomaly detection.

Unit 4

Neural Networks and Deep Learning:-Basics of artificial neural networks, Deep learning architectures (CNNs, RNNs, LSTM),Training neural networks and optimization techniques .

Unit 5

Advanced Topics in Machine Learning:-Support Vector Machines (SVM), Reinforcement learning,Transfer learning and domain adaptation, Model interpretability and explainability.



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19. Neural Networks with TensorFlow/Keras:
20. Build simple feedforward neural networks using TensorFlow or Keras.
21. Experiment with different activation functions, optimizers, and learning rates.
22. Convolutional Neural Networks (CNNs):
23. Implement CNN architectures for image classification tasks.
24. Fine-tune pre-trained CNN models for transfer learning.
25. Reinforcement Learning:
26. Develop basic reinforcement learning algorithms such as Q-learning or Deep Q-Networks (DQN).
27. Implement reinforcement learning agents to solve simple environments like OpenAI Gym.
28. Natural Language Processing (NLP):
29. Perform text preprocessing techniques like tokenization, stemming, and lemmatization.
30. Build sentiment analysis or text classification models using techniques like TF-IDF or word embeddings (Word2Vec, GloVe).

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Unit-IV

(12 Lectures)

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs
 WEB Programming: Introduction, Web Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI- Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers.

Unit-V

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

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.

BAIM501P: Python Programming Lab:-

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 a substring 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.






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BAIM0601T:Deep Learning

Unit 1

Introduction to Deep Learning:-Overview of neural networks and deep learning,History and evolution of deep learning,
Basic concepts: activation functions, loss functions, optimization algorithms.

Unit 2: Convolutional Neural Networks (CNNs):-Fundamentals of CNN architecture,Image classification with CNNs,CNN variants: VGG, ResNet, Inception, etc.Transfer learning with pre-trained CNN models.

Unit 3: Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM):-Introduction to RNNs and their applications, Vanishing gradient problem and the need for LSTM,Sequence modeling with LSTM,Applications: natural language processing, time series prediction.

Unit 4: Generative Adversarial Networks (GANs):-Introduction to GANs and their architecture,Training GANs: generator and discriminator networks,GAN applications: image generation, style transfer, anomaly detection.

Unit 5: Advanced Topics in Deep Learning:-Attention mechanisms in deep learning,Reinforcement learning with deep neural networks,Autoencoders and variational autoencoders (VAEs),Ethical considerations and challenges in deep learning.

Reference Book:

"Deep Learning" by Ian Goodfellow, YoshuaBengio, and Aaron Courville.
"Deep Learning for Computer Vision" by RajalingappaaShanmugamani"Recurrent Neural Networks and LSTM" by Nicolas P. Rougier, Thomas Viehmann, and Lorraine Liyanage."Generative Deep Learning" by David Foster.
"Advanced Deep Learning with Keras" by Rowel Atienz.

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BAIM0701T:-R PROGRAMMING

Unit 1

Introduction to R Programming:-Overview of R programming language,Installation and setup of R and RStudio,Basic data types, variables, and operators in R,Introduction to R packages and libraries.

Unit 2

Data Manipulation and Visualization:-Data import/export using packages like readr and readxl,Data manipulation and transformation with dplyr and tidyr,Data visualization with ggplot2, Exploratory data analysis (EDA) techniques.

Unit 3

Statistical Analysis with R:-Introduction to statistical analysis using R,Descriptive statistics and summary measures, Inferential statistics: hypothesis testing and confidence intervals, Linear regression and other statistical modeling techniques.

Unit 4

Advanced Data Analysis TechniquesTime series analysis with ts and forecast packages,Multivariate data analysis and clustering with cluster and factoextra packages,Nonlinear regression and machine learning algorithms using caret package,Introduction to Bayesian data analysis with rstan and brms packages.

Unit 5

R Programming for Reproducible Research and Reporting:-Introduction to R Markdown for dynamic reporting,Version control with Git and GitHub,Building interactive dashboards with Shiny,Best practices for reproducible research in R.

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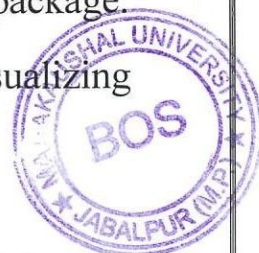
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- xv. Compute descriptive statistics, plot time series data, and identify trends or seasonality.
- xvi. Machine Learning with caret:
- xvii. Implement machine learning algorithms such as decision trees, random forests, or support vector machines using the caret package.
- xviii. Evaluate model performance using cross-validation techniques.
- xix. Text Mining and Natural Language Processing (NLP):
- xx. Perform text preprocessing tasks like tokenization, stemming, and stop-word removal.
- xxi. Analyze text data using techniques such as sentiment analysis or topic modeling.
- xxii. Web Scraping:
- xxiii. Extract data from websites using packages like rvest or BeautifulSoup.
- xxiv. Parse HTML content, extract relevant information, and store it in a structured format.
- xxv. Interactive Dashboards with Shiny:
- xxvi. Build interactive web applications using the Shiny package.
- xxvii. Create user-friendly interfaces for exploring and visualizing data.
- xxviii. Reproducible Research with R Markdown:
- xxix. Write dynamic reports and documents using R Markdown.

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REFERENCEBOOKS:

1. RajeshKumarArora, Optimization Algorithms and Applications, CRC Press, 2015.
2. Xinjie Yu, Mitsuo Gen, Introduction to Evolutionary Algorithms, Springer publication, 2010.
3. Algorithms for Reinforcement Learning (Synthesis Lectures on Artificial Intelligence and Machine Learning), Morgan & Claypool Publisher series, 2010.
- 4.

BAIM702T:-Optimization Technique Lab:-**Linear Programming:**

1. Formulate and solve linear programming problems using the simplex method or interior point methods.
2. Apply linear programming to resource allocation, production planning, or transportation problems.

Integer Programming:

3. Solve integer programming problems using branch-and-bound or cutting-plane algorithms.
4. Apply integer programming to optimization problems with discrete decision variables.

Genetic Algorithms:

5. Implement a genetic algorithm to solve optimization problems with a large search space.
6. Explore different crossover and mutation operators and their impact on algorithm performance.

Particle Swarm Optimization (PSO):

7. Develop a PSO algorithm to optimize continuous or discrete functions.
8. Investigate the effect of different parameters like swarm size and inertia weight on convergence behavior.

Simulated Annealing:

9. Implement simulated annealing to solve combinatorial optimization problems.
10. Tune temperature schedules and cooling rates to balance exploration and exploitation.

Ant Colony Optimization (ACO):

12. Build an ACO algorithm to solve optimization problems inspired by the foraging behavior of ants.
13. Experiment with pheromone updating rules and heuristic information to guide the search process.

Gradient Descent and Variants:

14. Implement gradient descent and its variants like stochastic gradient descent (SGD) or mini-batch gradient descent.
15. Apply gradient-based optimization to train machine learning models such as neural networks or linear regression.

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BAIM0801T:WEB TECHNOLOGY

UNIT I SCRIPTING (10 Lectures)

Web page Designing using HTML, Scripting basics- Client side and server side scripting.

JavaScript Object, names, literals, operators and expressions- statements and features- events- windows- documents- frames- data types- built-in functions- Browser object model- Verifying forms.- HTML5- CSS3- HTML5 canvas-

Website creation using tools.

UNIT II JAVA (10 Lectures)

Introduction to object oriented programming- Features of Java- Data types, variables and arrays- Operators- Control statements- Classes and Methods- Inheritance. Packages and Interfaces- Exception Handling- Multithreaded Programming- Input/Output- Files- Utility Classes- String Handling.

UNIT III JDBC (10 Lectures)

JDBC Overview – JDBC implementation – Connection class – Statements - Catching Database Results, handling database Queries. Networking– InetAddress class – URL class- TCP sockets– UDP sockets, Java Beans –RMI.

UNIT IV APPLET (10 Lectures)

Java applets- Life cycle of an applet – Adding images to an applet – Adding sound to an applet. Passing parameters to an applet. Event Handling. Introducing AWT: Working with Windows Graphics and Text. Using AWT Controls, Layout Managers and Menus. Servlet – life cycle of a servlet. The Servlet API, Handling HTTP Request and Response, using Cookies, Session Tracking. Introduction to JSP.

UNIT V XML AND WEB SERVICES (10 Lectures)

Xml – Introduction- Form Navigation- XML Documents- XSL – XSLT- Web services- UDDI- WSDL- Java web services – Web resources.

TEXT BOOKS:

1. Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How To Program 5 Edition.
2. Herbert Schildt, Java - The Complete Reference, 7th Edition. Tata McGraw-Hill Edition.
3. Michael Morrison XML, Unleashed Tech media SAMS.

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4. a) Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include 100USN, Name, Name of the College, Branch,

Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document. b) Create an XSLT style sheet for one student element of the above document and use it to create display of that element.

5.a) Write a Perl program to display various Server Information like Server Name, Server Software, Server protocol, CGI Revision etc. b) Write a Perl program to accept UNIX command from a HTML form and to display the output of the command executed.

6.a) Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages.

.b) Write a Perl program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.

7. Write a Perl program to display a digital clock which displays the current time of the server.

TOTAL REFERENCE BOOKS:

1. Kai Hwang, Fox, Jack G. Dongarra, "Distributed and Cloud Computing,
2. Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How To Program 5 Edition.

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- **Face Detection and Recognition:**
 - Face detection algorithms, facial landmarks.
 - Face recognition using PCA, eigenfaces, and deep learning methods.

Unit 4: Deep Learning for Computer Vision

- **Introduction to Convolutional Neural Networks (CNNs):**
 - Convolutional layers, pooling layers, fully connected layers.
 - Activation functions, loss functions, and backpropagation.
- **Popular CNN Architectures:**
 - LeNet, AlexNet, VGG, ResNet, Inception.
 - Transfer learning and fine-tuning pre-trained models.
- **Advanced Techniques:**
 - Generative Adversarial Networks (GANs) for image generation.
 - Autoencoders for image reconstruction and anomaly detection.
 - Semantic segmentation using FCNs (Fully Convolutional Networks) and U-Net.

Unit 5: Applications of Computer Vision

- **Object Tracking:**
 - Kalman filters, mean-shift, and camshift.
 - Optical flow and its applications in motion detection.
 - Advanced methods: DeepSORT, Siamese Networks for tracking.
- **3D Computer Vision:**
 - 3D reconstruction from multiple views.
 - Structure from motion (SfM), depth estimation, and stereo vision.
 - Applications in AR/VR.
- **Vision in Autonomous Systems:**
 - Vision-based navigation for autonomous vehicles and drones.
 - Lane detection, pedestrian detection, and SLAM (Simultaneous Localization and Mapping).

Additional Reference Books:

1. "Pattern Recognition and Machine Learning" by Christopher M. Bishop.
2. "Practical Machine Learning and Image Processing: For Facial Recognition, Object Detection, and Pattern Recognition Using Python" by Himanshu Singh.
3. "Modern Computer Vision with PyTorch" by V Kishore Ayyadevara, Yeshwanth Reddy.

LIST OF EXPERIMENTS:

1. Image Filtering and Enhancement

- **Description:** Implement basic image filtering techniques like smoothing (Gaussian blur), sharpening, and edge detection (Sobel, Canny). Experiment with adjusting brightness, contrast, and histogram equalization.

9. Optical Character Recognition (OCR) Using Tesseract

- **Description:** Perform OCR on scanned documents or images containing text. Use Tesseract to extract text from images and preprocess the image for better accuracy.
- **Tools:** Tesseract, OpenCV.
- **Applications:** Digitizing printed documents, license plate recognition, document automation.

10. Real-Time Object Tracking Using OpenCV

- **Description:** Implement real-time object tracking using techniques like meanshift, camshift, or Kalman filters. Track a moving object in a video feed and draw bounding boxes around it.
- **Tools:** OpenCV, Dlib.
- **Applications:** Motion tracking in sports, surveillance, and autonomous systems.

Additional Tools and Libraries:

- **OpenCV:** For basic image processing tasks, feature detection, object tracking, etc.
- **PyTorch / TensorFlow:** For deep learning tasks like image classification, object detection, and segmentation.
- **Scikit-learn:** For implementing clustering and machine learning algorithms.
- **Tesseract:** For OCR tasks, extracting text from images.

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BAIM0101D-T:Digital Marketing analysis

UNIT1:DIGITALMEDIAANDANAL(10Lectures)

Digital media types – Owned and earned social metrics – Paid searches and Organic Searches - Aligning DigitalandTraditionalAnalytics–Identifyingsocialmedialisteningtools– Understandingsocialmediaengagementsoftware–Socialmediaengagementtools.

UNIT2:TOOLSfordigitalANALYTICS(16Lectures)

Social Media Listening Tools - Evolution, Social analytics life cycle, Social media monitoringsoftware: Sysomos, Radian6, Visible Technologies,Zohosocial and others. Search AnalyticsTools – Basics ofsearch,Search analytics usecases,Search data,Googletrends,YouTubetrends, Google Adwordskeyword,Yahooclues,Collectinginsightsthroughsearchdata.

AudienceAnalysisTools–AudienceAnalysisUse Cases,Audienceanalysistooltypes–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(14Lectures)

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(10Lectures)

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



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BAIM0102D-T:-Computer Graphics

Unit 1

Introduction to Computer Graphics:-Overview of computer graphics and its applications,History and evolution of computer graphics technology,Graphics pipeline and the stages of rendering.

Unit 2

2D Graphics and Geometric Transformations:-Basic principles of 2D graphics rendering,Geometric transformations: translation, rotation, scaling, and shearing,Matrix representations and homogeneous coordinates.

Unit 3: 3D Graphics and Viewing Transformations:Introduction to 3D graphics primitives: points, lines, and polygons,Viewing transformations: perspective projection and orthographic projection,Clipping and hidden surface removal algorithms.

Unit 4: Rendering Techniques and Shading:-Illumination and reflection models: Phong model, Gouraud shading, and flat shading,Ray tracing and radiosity algorithms,Texture mapping and bump mapping techniques.

Unit 5: Advanced Topics in Computer Graphics:-Animation techniques: keyframe animation, skeletal animation, and morphing,GPU programming and parallel rendering with shaders,Virtual reality (VR) and augmented reality (AR) concepts and applications.

Reference Book:

"Computer Graphics: Principles and Practice" by John F. Hughes, Andries van Dam, Morgan McGuire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley. "Computer Graphics Through OpenGL: From Theory to Experiments" by Sumanta Guha. "Interactive Computer Graphics: A Top-Down Approach with OpenGL" by Edward Angel and Dave Shreiner. "Real-Time Rendering" by Tomas Akenine-Möller, Eric Haines, Naty Hoffman, Angelo Pesce, Michał Wajnacki.

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BAIM0104D-T Computer Vision and Robotics

Unit 1: Introduction to Computer Vision and Robotics: Overview of computer vision and robotics concepts, Applications of computer vision and robotics in various domains, Basics of image formation, processing, and analysis.

Unit 2: Image Processing and Feature Extraction: Image filtering techniques: convolution, Gaussian filtering, edge detection, Feature extraction methods: corner detection, scale-invariant feature transform (SIFT), speeded-up robust features (SURF).

Unit 3: Object Detection and Recognition: Object detection algorithms: Viola-Jones method, Histogram of Oriented Gradients (HOG), Object recognition techniques: template matching, bag-of-words model, deep learning approaches.

Unit 4: Robot Perception and Localization: Sensor fusion techniques: integrating data from multiple sensors (camera, LiDAR, IMU), Simultaneous Localization and Mapping (SLAM) algorithms, Visual odometry and visual-inertial odometry (VIO).

Unit 5: Robotics Control and Applications: Robot kinematics and dynamics: forward and inverse kinematics, Jacobians, Robot motion planning algorithms: potential fields, A* search, Rapidly-exploring Random Trees (RRT), Applications of computer vision and robotics in autonomous vehicles, industrial automation, and healthcare.

Reference Book:

"Computer Vision: Algorithms and Applications" by Richard Szeliski, "Digital Image Processing" by Rafael C. Gonzalez and Richard E. Woods, "Multiple View Geometry in Computer Vision" by Richard Hartley and Andrew Zisserman, "Probabilistic Robotics" by Sebastian Thrun, Wolfram Burgard, and Dieter Fox, "Robotics: Modelling, Planning and Control" by Bruno Siciliano, Lorenzo Sciarretto, Luigi Villani, and Giuseppe Oriolo.

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BAIM0105SB-T: Data warehouse and Data Mining

Unit 1: Introduction to Data Warehousing:- Overview of data warehousing:

concepts, architecture, components, Data warehouse modeling: star schema, snowflake schema, fact tables, dimension tables Extract, Transform, Load (ETL) processes: data extraction, data transformation, data loading.

Unit 2: Data Warehouse Design and Implementation:-

Dimensional modeling: facts, dimensions, hierarchies

Data warehouse implementation: relational vs. multidimensional databases, OLAP (Online Analytical Processing), data cubes

Data warehouse administration and management: security, performance tuning, backup and recovery

Unit 3: Data Mining Fundamentals:- Introduction to data mining: definition,

objectives, challenges, Data preprocessing: cleaning, integration, transformation, reduction,

Data mining techniques: classification, clustering, association rule mining, outlier detection.

Unit 4: Data Mining Algorithms and Applications:-

Classification algorithms: decision trees, neural networks, support vector machines, ensemble methods

Clustering algorithms: K-means, hierarchical clustering, density-based clustering, Association rule

mining algorithms: Apriori algorithm, FP-growth algorithm, Applications of data mining: customer segmentation, market basket analysis, churn prediction, fraud detection.

Unit 5: Advanced Topics in Data Mining:-

Text mining: techniques for mining unstructured data, sentiment analysis, topic modeling,

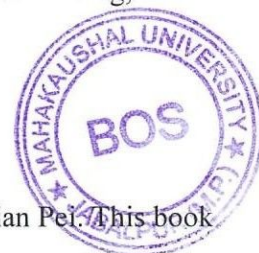
Web mining: mining web data, web usage mining, web content mining, web structure mining,

Social media mining: mining social networks, opinion mining, influence analysis,

Big data analytics: challenges and opportunities in mining large-scale datasets.

Recommended Book:

"Data Mining: Concepts and Techniques" by Jiawei Han, Micheline Kamber, and Jian Pei. This book provides a comprehensive overview of data mining concepts, techniques, and algorithms. It covers both foundational principles and advanced topics in data mining, making it suitable for students at various levels of expertise. Additionally, "The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling" by Ralph Kimball and Margy Ross is an excellent resource for understanding dimensional modeling and designing effective data warehouses.



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BAIM0104SB-T:Natural Language Processing (NLP)

Unit 1: Introduction to Natural Language Processing:- Overview of NLP: definition, applications, and challenges, Text preprocessing: tokenization, stemming, lemmatization, stop word removal, normalization, Language modeling: n-gram models, probabilistic language models, Text representation: bag-of-words model, TF-IDF, word embeddings.

Unit 2: Syntax and Parsing:- Syntax analysis: context-free grammars, parse trees, constituency vs. dependency parsing, Parsing techniques: top-down parsing, bottom-up parsing, shift-reduce parsing, Part-of-Speech (POS) tagging: POS tagging algorithms (e.g., Hidden Markov Models, Conditional Random Fields), evaluation metrics, Named Entity Recognition (NER): approaches, features, evaluation.

Unit 3: Text Classification and Sentiment Analysis:- Text classification: document classification, sentiment analysis, spam detection, Machine learning algorithms for text classification: Naive Bayes, Support Vector Machines, Neural Networks, Sentiment analysis: approaches (lexicon-based, machine learning-based), sentiment lexicons, evaluation metrics, Document clustering: K-means clustering, hierarchical clustering, evaluation metrics.

Unit 4: Sequence Labeling and Information Extraction:- Sequence labeling: Named Entity Recognition (NER), Part-of-Speech (POS) tagging, Chunking, Information extraction: entity extraction, relation extraction, event extraction, Sequence labeling algorithms: Conditional Random Fields (CRFs), Hidden Markov Models (HMMs), Long Short-Term Memory (LSTM) networks, Evaluation methods for sequence labeling and information extraction tasks.

Unit 5: Advanced Topics in NLP:- Neural network architectures for NLP: Recurrent Neural Networks (RNNs), Convolutional Neural Networks (CNNs), Transformer models, Neural language models: Word2Vec, GloVe, BERT, GPT, Text generation: language modeling, sequence-to-sequence models, attention mechanisms, Domain-specific applications of NLP: biomedical NLP, legal NLP, social media NLP, Ethical considerations in NLP: bias, fairness, privacy, responsible AI.



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BAIM0102SB-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 I, No Starch Press Inc., 2008.
- Michael T. Simpson, Kent Backman, James E. Corley, — Hands-On Ethical Hacking and Network Defense I, Cengage Learning, 2013.



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BAIM0101SB-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.

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 U

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BAIM0108D-T:Ad-hoc & Sensor Networks

Unit 1: Introduction to Ad-hoc & Sensor Networks:-Overview of ad-hoc networks and sensor networks,Characteristics, challenges, and applications of ad-hoc and sensor networks,Classification of ad-hoc networks based on topology and communication models.

Unit 2: Wireless Communication Technologies for Ad-hoc Networks:-Wireless communication fundamentals: modulation techniques, multiple access schemes,MAC layer protocols for ad-hoc networks: CSMA, TDMA, CDMA,Routing protocols for ad-hoc networks: DSR, AODV, OLSR.

Unit 3: Sensor Network Architectures and Protocols:-Sensor node architecture: sensor types, energy sources, processing capabilities,Medium Access Control (MAC) protocols for sensor networks: S-MAC, TDMA-based protocols,Routing protocols for sensor networks: LEACH, TEEN, Directed Diffusion.

Unit 4: Energy-Efficient Techniques and Optimization in Ad-hoc & Sensor Networks:-Energy models for ad-hoc and sensor nodes,Energy-efficient communication protocols and algorithms,Sleep scheduling, duty cycling, and power management techniques.

Unit 5: Security and Privacy in Ad-hoc & Sensor Networks:-Security threats and attacks in ad-hoc and sensor networks,Security mechanisms: authentication, encryption, key management, Privacy-preserving techniques for data aggregation and dissemination.

Reference Book:

"Ad Hoc & Sensor Networks: Theory and Applications" by Carlos de MoraesCordeiro and Dharma Prakash Agrawal, "Wireless Communications & Networking" by Vijay K. Garg, "Wireless Sensor Networks: Principles and Practice" by Ali Miri and Raza Jafri,"Energy-Efficient Communications and Networking" by WalidSaad and Zhu Han, "Security in Ad-hoc and Sensor Networks" by Fei Hu and Neeli R. Prasad.

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BAIM0107D-T:AI and Data Science in Finance

Unit 1: Introduction to AI and Data Science in Finance

- Overview of AI, machine learning, and data science in finance.
- History and evolution of AI in the financial industry.
- Key financial applications of AI: fraud detection, algorithmic trading, credit scoring, and risk management.
- Data types in finance: structured vs. unstructured data (market data, financial statements, alternative data sources).

Unit 2: Machine Learning Techniques for Financial Analysis

- Supervised learning algorithms: regression, decision trees, random forests.
- Classification techniques: logistic regression, support vector machines (SVM), k-nearest neighbors (KNN).
- Unsupervised learning: clustering techniques (K-means, hierarchical), principal component analysis (PCA).
- Feature engineering and selection in finance.
- Model evaluation and performance metrics (ROC-AUC, precision-recall, etc.).

Unit 3: Time Series Analysis and Forecasting in Finance

- Introduction to time series data and its financial applications.
- Autoregressive models: AR, MA, ARMA, ARIMA.
- Seasonality, stationarity, and differencing.
- Forecasting techniques: Exponential Smoothing, Holt-Winters method, GARCH models.
- Long Short-Term Memory (LSTM) networks for time series forecasting.

Unit 4: Algorithmic Trading and Portfolio Optimization

- Basics of algorithmic trading: execution, market making, arbitrage.
- Designing trading algorithms using AI/ML models.
- Portfolio theory: Modern Portfolio Theory (MPT), CAPM, efficient frontier.
- Risk management and portfolio optimization using AI.
- Reinforcement learning for trading strategies.
- *Quantitative Trading* by Ernie Chan

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Open Elective Compulsory

Course/Generic Elective Compulsory

Course

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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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