

Subject Name	L	T	P	Credit
Artificial Intelligence Programming with LISP	3	-	2	4

Unit-I

Overview of AI: The AI problems, what is an AI technique, Characteristics of AI applications, Problem Solving, Search and Control Strategies General problem solving, production systems, control strategies forward and backward chaining, exhaustive searches depth first breadth first search, Search in pacemen , multi-Agent pacmen.

Unit-II

Heuristic Search Techniques: Hill climbing, branch and bound technique, best first search & A* algorithm, AND / OR graphs, problem reduction & AO* algorithm, constraint satisfaction problems. **Knowledge Representations:** First order predicate calculus, skolemization, resolution principle & unification, interface mechanisms, horn's clauses, semantic networks, frame systems and value inheritance, scripts, conceptual dependency.

Unit-III

Introduction to LISP programming: Syntax and numeric functions, Basic LISP manipulation functions, Predicates and conditionals, Input-output and local variables, Iteration and recursion, Property list and Array. Decision diagram and value of perfect information Hidden markov model, VOI, HMM's and Practical filtering, ghostbuster.

Unit-IV

Natural Language processing: Parsing techniques, context free grammar, case and logic grammars, semantic analysis. Game playing Minimax search procedure, alpha-beta cutoffs, additional refinements. Planning component of planning systems, goal stack planning, non linear planning. **Reinforcement Learning:** Direct evaluation, Q- learning, model-based: RL grid. Probability- Conditional probability

Unit-V

Probabilistic Reasoning and Uncertainty: Probability theory, bayes theorem and bayesian networks, certainty factor. Expert Systems Introduction to expert system and application of expert systems, various expert system shells, vidwan frame work, knowledge acquisition, case studies, MYCIN. **Learning:** Rote learning, learning by induction, explanation based learning.

Reference Books:

1. Russell, Stuart and Norvig, Peter, "Artificial Intelligence: A Modern Approach".
2. Spivey, Michael, " An Introduction to Logic Programming".
3. Weizenbaum, Joseph , " Computer power and human reason".
4. Elaine Rich and Kevin Knight , " Artificial Intelligence".
5. Dan W. Patterson , "Introduction to Artificial Intelligence and Expert Systems".

List of Experiments

1. Study of programming in LISP introduction.
2. Syntax and numeric functions.
3. LISP manipulation functions.
4. Predicates and conditionals.
5. Input-output and local variables.
6. Iteration and recursion.
7. Property list and array.
8. Decision diagrams.
9. Study about water jug problem.
10. Program for factorial using recursion.
11. Program for reverse a string.



12. Program for swapping of two numbers.
13. Program for word count.
14. Program to check entered number is palindrome or not.
15. Program to compare two numbers.
16. Program for calculator.
17. Program for calculating percentage of students and make division accordingly.
18. Algorithm of "Travelling sales man problem" with solution.
19. Program for "Tic Tac Toe".
20. Study of 8-puzzel problem.
21. Bayes theorem and bayesion network.
22. Introductory programs of machine learning with python.

Subject Name	L	T	P	Credit
Data Structure using C++	3	1	2	5

Unit-1

Introduction: Basic concepts of OOPs, Templates, Algorithm Analysis, ADT: List (Singly, Doubly and Circular) Implementation, Array, Pointer, Cursor Implementation.

Unit-2

Basic Data Structures: Stacks and Queues: ADT, Implementation and Applications, Trees: General, Binary, Binary Search, Expression Search, AVL, Splay, B-Trees: Implementations, Tree Traversals.

Unit-3

Advanced Data Structures: Set Implementation: Basic operations on set, Priority Queue: Implementation, Graphs: Directed Graphs, Shortest Path Problem, Undirected Graph, Spanning Trees, Graph Traversals.

Unit-4

Memory Management : Issue, Managing Equal Sized Blocks, Garbage Collection Algorithms for Equal Sized Blocks, Storage Allocation for Objects with Mixed Sizes, Buddy Systems, Storage Compaction.

Unit-5

Searching sorting and design techniques : Searching Techniques, Sorting: Internal Sorting: Bubble Sort, Insertion Sort, Quick Sort, Heap Sort, Bin Sort, Radix Sort, External Sorting: Merge Sort, Multi-way Merge Sort, Polyphase Sorting - Design Techniques: Divide and Conquer Dynamic Programming: Greedy Algorithm, Backtracking, Local Search Algorithms.

Reference Books :

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson P
2. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education P
3. Drozdek, Data Structures and algorithm in Java, Cengage (Thomson)
4. Gilberg, Data structures Using C++, Cengage
3. Horowitz, Sahni, Rajasekaran, "Computer Algorithms", Galgotia,
4. Tanenbaum A.S., Langram Y, Augestien M.J., "Data Structures using C & C++", Prentice Hall of India, 2002

List of Experiments

1. Write a program to implement insertion () and deletion () operation in array.
2. Write a program for addition, subtraction, multiplication and transpose of matrix.
3. Write a program to implement template in C++.
4. Write a program to implement Push () and Pop () operation in stack using array.
5. Write a program to convert an expression from infix to postfix.
6. Write a program to implement insertion () and deletion () operation in queue using array.
7. Write a program to create 5 nodes in single linked list.
8. Write a program to insert an element at the end, beginning and at the end position in single linked list.



9. Write a program to delete an element at the end, beginning and at the end position in single linked list.
10. Write a program to implement stack using linked list.
11. Write a program to implement Queue using linked list.
12. Write a program to search an element in array using linear search and binary search.
13. Write a program to sort an array using insertion sort.
14. Write a program to sort an array using bubble sort.
15. Write a program to sort an array using selection sort.
16. Write a program to sort an array using quick sort.
17. Write a program to implement tree traversal technique.
18. Write a program to implement graph traversal technique.
19. Write a program to implement kruskal's and prim's algorithm.

Subject Name	L	T	P	Credit
Object Oriented Programming using JAVA	3	1	2	5

Unit-I

Introduction to OOPs concept, Introduction to Swing: JFrame, Handling Swing Controls like Icons, Labels, Buttons, Text Boxes,,Checkbox,ToolTip,Combo, Boxes, Tabbed Pains, Scroll Pains, Trees, Tables, Differences between AWT Controls & Swing Controls Developing

Unit-II

Servlet: Web Terminology, Servlet Interface, Servlet Life Cycle, RequestDispatcher, ServletRequest, ServletConfig, Attributes in Servlet, Servlet Filter, Session management, Pagination, ServletInputStream, ServletOutput

Unit-III

JSP: Intro, life cycle of JSP, JSP Scripting elements, Request, Response, Config, Application, Session, PageContext, Page, Page directive, Include directive, Taglib directive, Exception, Action Elements: js:forward, include etc, Pagination

Unit-IV

JDBC: Intro, SQL Syntax, Driver Types, Connections, Statements, Result Sets, Data Types, Select, Insert, Update, Delete Records, Transactions, Exceptions.

Unit-V

Introduction to Struts and Hibernate: Bssic architecture, mapping, configuration, MVC Concepts, Concepts: Lazy loading and caching.

Reference Books:

1. Head First Servlets and JSP
2. J2EE: The Complete Reference
3. Struts in Action: Building Web Applications with the Leading Java Framework
By: Ted N. Husted, Cedric Dumoulin, George Franciscus, David Winterfeldt.
Publisher: Manning
4. Beginning Java EE 6 with GlassFish 3, Second Edition
5. Hibernate in Action By: Christian Bauer (Author), Gavin King (Author).
Publisher: Manning

List of Experiments

1. Design a registration form using different swing components.
2. Develop a database application that uses any JDBC driver.
3. Develop a Graphical User Interface that performs the following SQL operations: a) Insert b) Delete c)Update
4. Develop a program to present a set of choice for user to select a product and display the price of product.
5. Develop a simple Servlet program which maintains a counter for the number of

times it has been accessed since its loading, initialize the counter using deployment descriptor

6. Create login form and perform state management using Cookies, HttpSession and URL Rewriting.
7. Create Servlet file which contains following functions: 1. Connect 2. Create Database 3. Create Table 4. Insert Records into respective table 5. Update records of particular table of database 6. Delete Records from table. 7. Delete table and also database.
8. Write down the program in which input the two numbers in an html file and then display the addition in JSP file.
9. Perform Database Access through JSP.
10. Develop a simple JSP program for user registration and then control will be transferring it into second page.
11. Develop a simple JSP program for user login form with static and dynamic database.
12. Develop a JSP program to display the grade of a student by accepting the marks of five subjects.
13. Design a JDBC application which will demonstrate Scrollable ResultSet functionality.
14. Design a JDBC application which will demonstrate Transaction management functionality.
15. Write down the Program for testing the Servlet and study deployment descriptor.

Subject Name	L	T	P	Credit
Advance Database	3	1	-	4

Unit-I

Query Processing and Optimization: Overview, Query interpretation, Equivalence of expressions, Join strategies for parallel processing, Algorithm for executing query operations, Heuristics of Query Optimization cost estimation of queries, Basic query optimization strategies: Selection operation, Sorting, Join operation.

Unit-II

Transaction Processing and Concurrency control: Transaction concepts, Transaction execution and Problems, Transaction execution and control with SQL, Transaction properties, Transaction log, Concurrency control, Locking methods for concurrency control, Timestamp methods for concurrency control, Optimistic methods for concurrency control (Read phase, validation phase, Write phase), Deadlock handling - detection and resolution.

Unit-III

Database backup and Recovery: Need of Database backup, Database backup techniques, Types of Database failures, Types of Database recovery (Forward recovery, Backward recovery, Media recovery), Recovery techniques (Deferred Update, Immediate update, Shadow Paging, Checkpoints), Buffer management.

Unit-IV

Implementing Security in Databases: Security & integrity threats, Defense mechanisms, Statistical database auditing & control, Granting/revoking of privileges using SQL. Introduction to Other Databases: Overview of parallel databases, Overview of Distributed databases, Overview of Object oriented databases.

Unit-V

Understanding the main features of PL/SQL, PL/SQL Architecture, advantages of using procedures, Basic code structure, variables, conditional statements, looping (loop statements, while loops, for loops, Cursor FOR loops) PL/SQL Stored procedures (functions, procedures, packages and triggers).

Reference Books:

1. Database Management Systems, Ramakrishnan, Gehrke, Third edition, McGraw Hill
2. SQL, PL/SQL – The programming Language Oracle-by Ivan Bayross
3. Database System Concept- Silberschatz, Korth, Sudarshan, Fifth Edition, McGraw Hill
4. Fundamentals of Database Systems, Elmasri Navathe, Third edition, Addison Wesley
5. Database Systems: Design, Implementation and Management, seventh edition, Peter Rob, Carlos Coronel, Thomson Course technology

Subject Name	L	T	P	Credit
Computer Programming Using Python	3	1	-	4

Unit-I

Introduction and overview: Introduction, What is Python, Origin, Comparison, Comments, Operators, Variables and Assignment, Global and local variables, Numbers, Strings, Lists and Tuples, Dictionaries, Accessing values in dictionaries, Working with dictionaries, Built-in Function, Files and the open() Built-in Function, Errors and Exceptions, Functions, Classes, Modules. Syntax and Style Statements and Syntax, Variable Assignment, Identifiers, Basic Style Guidelines, Memory Management, Python Application Examples.

Unit-II

Python Objects: Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types. Numbers and Strings Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions. Sequences: Strings, Lists, and Tuples, Sequences, Strings, Strings and Operators, String-only Operators, Built-in Functions, String Built-in Methods, Special Features of Strings.

Unit-III

Lists and Operators: Introduction, Accessing list, Operations, Working with lists Built-in Functions, List Type Built-in Methods, Special Features of Lists, Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples.

Conditionals and Loops: if statement, else Statement, else if Statement, while Statement, for Statement, break Statement, continue Statement, pass Statement, else Statement.

Unit-IV

Functions: Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions.

Files and Input/output operations: File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files.

Unit-V

Modules: Importing module, Math module, Random module, Packages, Composition

Regular Expressions: Introduction/Motivation, Special Symbols and Characters for REs, REs and Python.

Exception handling: Exception, Exception Handling, Except clause, Try ? finally clause, User Defined Exceptions.

Reference Books:

1. Chun, J Wesley, Core Python Programming, 2nd Edition, Pearson.
2. Barry, Paul, Head First Python, 2nd Edition.
3. Lutz, Mark, Learning Python, 4th Edition.
4. Python: The Complete Reference.

Subject Name	L	T	P	Credit
Machine Learning	3	1	-	4

Unit-I

Introduction: Introduction to Machine Learning, Machine learning honor code, Linear Regression with One Variable, Model representation, Cost function-Intuition I, Cost function-Intuition II, Parameter Learning: Gradient Descent, Gradient descent intuition, Gradient descent for linear- regression. Linear Algebra Review: Matrices and Vectors, Addition and Scalar multiplication, Matrix vector multiplication, Matrix matrix multiplication, Matrix multiplication properties, Inverse and Transpose.

Unit-II

Linear Regression with Multiple Variables: Multivariate Linear Regression: Multiple feature, Gradient Descent for multiple variables, Gradient descent in practice I – feature scaling, Gradient descent in practice II -Learning rate, Features and Polynomial regression, Computing- Parameters Analytically, Normal Equation, Normal equation- Noninvertibility.

Classification and Representation: Classification, Hypothesis representation, Decision boundary, Logistic regression model: Cost function, Simplified cost function and Gradient descent, Advanced optimization, Multiclass Classification: One-vs-all. Regularization- Solving the Problem of Overfitting, Problem of overfitting, Cost function, Regularized Linear- regression, Regularized logistic regression.

Unit-III

Neural Networks: Representation: Non-linear hypotheses, Neurons and the brain, Neural Networks-Model representation-I,II, Applications: Examples and Intuitions-I,II, Multiclass classification. Neural Networks: Learning, Cost Function and Backpropagation, Cost Function, Backpropagation- algorithm, Backpropagation Intuition, Backpropagation in practice, Implementation note: Unrolling parameters, Gradient Checking, Random Initialization, Putting it together, Application of neural networks- Autonomous Driving.

Advice for Applying Machine Learning: Evaluating a Learning Algorithm, Deciding what to try next, Evaluating a Hypotheses, Model Selection and Train/Validation/Tests Stes, Bias vs Variance: Diagnosing Bias vs Variance, Regularization and Bias/Variance, Learning Curves, Machine Learning System Design: Building a Spam Classifier- Prioritizing what to work on, Error-Analysis, Handling Skewed data, Handling skewed data.

Unit-IV

Large Margin Classification: Optimization objective, Large margin Intuition, Mathematics behind large margin- classification. Kernels-I,II, SVMs in Practice.

Unsupervised Learning: Clustering: Unsupervised learning: Introduction, K-Means algorithm, Optimization objective, Random Initialization, Choosing the number of clusters, Motivation I: Data Compression, Motivation II: Visualization, Principal Component Analysis-Principal Component Analysis Problem Formulation, Principal Component Analysis Algorithm, Applying PCA- Reconstruction from compressed representation, Choosing the number of principal components.

Application Example: Photo OCR , Problem description and pipeline, Sliding windows, Getting lots of data and artificial data, Ceiling analysis,

Unit-V

Anomaly Detection: Density Estimation, Problem motivation, Gaussian distribution and algorithm, Building an anomaly detection system: Developing and Evaluating and anomaly detection- system, Anomaly detection vs. Supervised learning, Multivariate Gaussian Distribution- Multivariate Gaussian Distribution, Anomaly detection using the Multivariate Gaussian Distribution. Collaborative Filtering and its algorithm, Low Rank Matrix Factorization-Vectorization: Low rank matrix factorization, Implementational detail: Mean Normalization.

Large- Scale Machine Learning: Gradient Descent with Large Datasets-Learning with large datasets, Stochastic gradient descent, Mini-Batch gradient descent, Stochastic gradient descent convergence.

Reference Books:

1. Baldi, P. and Brunak, S. (2002). Bioinformatics: A Machine Learning Approach. Cambridge, MA: MIT Press.
2. Bishop, C. M. Neural Networks for Pattern Recognition. New York: Oxford University Press (1995).
3. C. Bishop. Pattern Recognition and Machine Learning. Springer 2007.
4. R. Duda, P. Hart, and D. Stork. Pattern Classification. John Wiley & Sons, second edition, 2001.
5. Mitchell, T. (1997). [Machine Learning](#). New York: Mc Graw-Hill.
6. D. Barber. Bayesian Reasoning and Machine Learning. Cambridge University Press, 2012.
7. S. Shalev-Shwartz, and S. Ben-David. Understanding Machine Learning: From Theory to Algorithms. Cambridge University Press, 2014.

Subject Name	L	T	P	Credit
Digital Image Processing	3	1	-	4

Unit-I

Digital Image fundamentals: A simple Image model. Sampling and quantization, Relationship between pixel, imaging geometry, image transformation, introduction to fourier transformation, Discrete fourier transformation, fast fourier transformation.

Unit-II

Image Enhancement: Histogram processing, image subtraction, image averaging, smoothing filters, sharpening filters, enhancement in frequency domain, low pass filtering, high pass filtering.

Unit-III

Image Encoding & Segmentation: Segmentation, detection of discontinuation by point detection, line detection, edge detection. Edge linking & Boundary Detection: Local analysis, global by Hough transform & Global by graph theoretic techniques.

UNIT-IV

Image Representation and Description: Chain codes, polygonal approximation, signatures, boundary segments, boundary descriptors, regional descriptors, introduction to image understanding. Motion Tracking , Image differencing, Feature matching, Optic flow

UNIT-V

Image Compression: Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

Reference Books:

1. Gonzalez and Woods "Digital Image Processing", Addison Wesley
2. Gonzalez and Woods "Digital Image Processing using MATLAB", Addison Wesley
3. SchalKoff: Digital Image Processing & Computer Vision, Addison Wesley.
4. M. Sonka et.al : Image Processing and Machine Vision, Prentice Hall.
5. Ballard & Brown: Computer Vision, Prentice Hall.
6. Jain A. K. Fundamentals of Digital Image Processing, PHI

Subject Name	L	T	P	Credit
Information Security	3	1	-	4

Unit-I

History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

Unit-II

Overview of Networking Concepts: Basics of Communication Systems, Transmission Media, Topology and Types of Networks, TCP/IP Protocol Stacks, Wireless Networks, the Internet. **Information Security Concepts:** Background and Current Scenario, Types of Attacks, Goals for Security, E-commerce Security, Computer Forensics, Steganography. **Security Threats and Vulnerabilities:** Overview of Security threats, Weak / Strong Passwords and Password Cracking, Insecure Network connections, Malicious Code, Programming Bugs, Cyber-crime and Cyber terrorism, Information Warfare and Surveillance

Unit-III

Cryptography: Introduction to Cryptography, Digital Signatures, Public Key infrastructure, Applications of Cryptography, Tools and techniques of Cryptography.

Unit-IV

Security Management Practices: Overview of Security Management, Information Classification Process, Security Policy, Risk Management, Security Procedures and Guidelines, Business Continuity and Disaster Recovery, Ethics and Best Practices.

Unit-V

Information and Network Security Access Control and Intrusion Detection: Overview of Identification and Authorization, Overview of IDS (Intrusion Detection Systems) and IPS (Intrusion Prevention Systems), Intrusion Detection Systems vs. Intrusion Prevention Systems, Scanning and Analysis Tools, Access Control Devices, Physical Security, Security and Personnel. **Server Management and Firewalls:** User Management, Overview of Firewalls, Types of Firewalls, DMZ and firewall features. **Security for VPN and Next Generation Technologies:** VPN Security, Security in Multimedia Networks, Various Computing Platforms: HPC, Cluster and Computing Grids, Virtualization and Cloud Technology and Security.

References Book:

1. Complete Reference Second Edition.
2. Mark Stamp; Information Security Principles and Practice.
3. Mr. Varun Srivastava; A Complete Guide to IT Security.