DEPARTMENT OF COMPUTER SCIENCE
POOMPUHAR COLLEGE (AUTONOMOUS)
MELAIYUR
COURSE STRUCTURE FOR PG COURSE

M.Sc (Computer science)

(Applicable to the candidates admitted from the academic year (2019-onwards)

SEMESTER	SUBJECT	HRS	CREDIT	EXAM	MARKS
I	CCI –Advanced Java Programming	6	4	3	100
	CCII- Design and Analysis Algorithms	6	4	3	100
	CCIII -Distributed Operating Systems	6	4	3	100
	CCIV – Data Mining	6	4	3	100
	CPI Advanced Java Programming Lab	6	4	3	100
	Total	**30**	**20**		**500**
II	CC V- Programming in Python	6	5	3	100
	CC VI-Internet of Things	6	5	3	100
	CP II-Python Programming Lab	6	4	3	100
	EC I-Mobile Computing	6	5	3	100
	EC II-Digital Image Processing	6	5	3	100
	Total	**30**	**24**		**500**
III	CC VII- Compiler Design	6	5	3	100
	CC VIII- Advanced Web Technology	6	5	3	100
	CP III-Web Technology Lab	6	4	3	100
	EC III-Cloud Computing	6	5	3	100
	EC IV-Software Project Management	6	5	3	100
	Total	**30**	**24**		**500**
IV	CC IX-PHP Programming	6	5	3	100
	CC X-Machine Learning	6	5	3	100
	CP IV-PHP Programming Lab	6	4	3	100
	EC V-Soft Computing	6	4	3	100
	Project	6	4	3	100
	Total	**30**	**22**		**500**

<div align="center">**OUTCOME BASED EDUCATION**</div>

<div align="center">**Post Graduate – Science**</div>

Programme Outcomes:

PO1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of a postgraduate programme of study.

PO2: Ethical Value

Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.

PO3: Individual and Team Leadership Skill

Capability to lead themselves and the team to achieve organizational goals.

PO4: Employability & Entrepreneurial Skill

Inculcate contemporary business practices to enhance employability skills in the competitive environment. Equip with skills and competencies to become an entrepreneur.

PO5: Contribution to Society

Succeed in career endeavors and contribute significantly to society.

Program specific Outcomes for M.SC

PSO1: Write program in advance programming concepts in java, text processing, scripting etc,

PSO2: Learn new technology, graphing the concepts and issues behind its use and the use of computers.

PSO3: Understand the concepts of core subjects like Artificial Intelligence, Data Structure, DBMS and Operating system etc.,

PSO4: Study, understand the concepts of Natural Language Processing and its applications

PSO5: Do a project work of six months duration in the last semester, applying the concepts learned.

CC I- ADVANCED JAVA PROGRAMMING

Objectives

☐ To deepen student's programming skills by analyzing the real world problem in a programmer's point of view and implement the concepts in real time projects

☐ To enable the students to learn the ethical, historical, environmental and technological aspects of Advanced Java Programming and how it impacts the social and economic development of society

UNIT-I

Design Patterns: Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern, Prototype Pattern, Singleton Pattern- Adapter Pattern-Proxy Pattern-Decorator Pattern- Command Pattern- Template Pattern- Mediator Pattern-Collection Framework – Array List class – Linked List class – Array List vs. Linked List - List Iterator interface - Hash Set class- Linked Hash Set class-Tree Set class Priority Queue class - Map interface-Hash Map class- Linked Hash Map class –Tree Map class - Comparable interface -Comparator interface-Comparable vs. Comparator

UNIT-II

Applet Fundamentals- Applet Class - Applet lifecycle- Steps for Developing Applet Programs- Passing Values through Parameters- Graphics in Applets- GUI Application **-** Dialog Boxes - Creating Windows - Layout Managers – AWT Component classes – Swing component classes- Borders – Event handling with AWT components - AWT Graphics classes - File Choosers - Color Choosers – Tree – Table –Tabbed panels–Progressive bar - Sliders.

UNIT-III

JDBC **-**Introduction - JDBC Architecture - JDBC Classes and Interfaces – Database Access with MySQL -Steps in Developing JDBC application - Creating a New Database and Table with JDBC - Working with Database Metadata; Java Networking Basics of Networking - Networking in Java- Socket Program using TCP/IP - Socket Program using UDP- URL and Inet address classes.

UNIT–IV

Servlet: Advantages over Applets - Servlet Alternatives - Servlet Strengths - Servlet Architecture - Servlet Life Cycle – Generic Servlet, Http Servlet - First Servlet - Invoking Servlet - Passing Parameters to Servlets - Retrieving Parameters - Server-Side Include – Cookies- JSP Engines - Working with JSP - JSP and Servlet - Anatomy of a JSP Page- Database Connectivity using Servlets and JSP.

UNIT-V

Lambda Expressions- Method Reference- Functional Interface- Streams API, Filters- Optional Class- Nashorn- Base 64 Encode Decode- JShell(RPEL)-Collection Factory Methods- Private Interface Methods- Inner Class Diamond Operator- Multiresolution Image API.

Textbooks

1. Bert Bates, Karthy Sierra , Eric Freeman, Elisabeth Robson, "Head First Design Patterns", O'REILLY Media Publishers.(1st-Unit).

2. Herbert Schildt, "Java: A Beginner Guide", Oracle Pres-Seventh Edition. (2nd and 3rd Unit).

3. Murach's, "Java Servlets and JSP", 2nd Edition, Mike Murach & Associates Publishers; 3rd Edition. (4th Unit).

4. Warburton Richard, "Java 8 Lambdas", Shroff Publishers & Distributors Pvt Ltd. (5th Unit).

References

1. Paul Deitel and Harvey Deitel, "Java: How to Program", Prentice Hall Publishers; 9th Edition.

2. Jan Graba, "An Introduction to Network Programming with Java-Java 7 Compatible", 3rd Edition, Springer.

Outcomes

☐ Able to develop a Graphical User Interface (GUI) with Applet and Swing.

☐ Develop a Client-Server Application with Database Maintenance.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	0	2	2	3	3
CO2	3	0	2	2	2
CO3	2	3	2	2	3
CO4	2	2	3	2	2
CO5	2	0	3	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

CC II DESIGN AND ANALYSIS OF ALGORITHMS

Objective: To learn effective problem solving in Computing applications and analyze the algorithmic procedure to determine the computational complexity of algorithms.

Unit I
Introduction: Algorithm Definition – Algorithm Specification – Performance Analysis-Asymptotic Notations. Elementary Data Structures: Stacks and Queues – Trees – Dictionaries – Priority Queues – Sets and Disjoint Set Union – Graphs

Unit II
Divide and Conquer: The General Method – Defective Chessboard – Binary Search – Finding The Maximum And Minimum – Merge Sort – Quick Sort – Selection - Strassen's Matrix Multiplication.

Unit III
The Greedy Method: General Method - Container Loading - Knapsack Problem - Tree Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost Spanning Trees - Optimal Storage On Tapes – Optimal Merge Patterns - Single Source Shortest Paths.

Unit IV
Dynamic Programming: The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees - String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS.

Unit V
Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: Least Cost searchhod - 0/1 Knapsack Problem.

Text Book
1. Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009.
Tamilnadu State Council for Higher Education

References
1. Data Structures Using C - Langsam, Augenstien, Tenenbaum, PHI
2. Data structures and Algorithms, V.Aho, Hopcropft, Ullman , LPE
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem- TMH.
4. Carlos A.Coello Coello, Gary B.Lamont, David A.Van Veldhuizen, "Evolutionary Algorithms for Solving Multi-Objective Problems", Springer 2nd Edition, 2007.

Outcomes
☐ It gives stepwise procedure to solve problems.
☐ The Problems can be broken down into small pieces for program development.

Efficient approach of solving problems by a model of computations

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	0	2	3	3	3
CO2	3	0	2	2	2
CO3	2	3	2	2	3
CO4	3	2	3	3	2
CO5	2	0	3	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

CC III - DISTRIBUTED OPERATING SYSTEM

Objectives
1. To study Distributed operating system concepts
2. To understand hardware, software and communication in distributed OS
3. To learn the distributed resource management components.
4. Practices to learn concepts of OS and Program the principles of Operating Systems

UNIT I
Introduction – Operating System Definition – Functions of Operating System – Types of Advanced Operating System – Design Approaches – Synchronization Mechanisms – concepts of a Process – Critical Section Problem – Process Deadlock – Models of Deadlock – Conditions for Deadlock – System with single-unit requests, Consumable Resources , Reusable Resources.

UNIT II
Distributed Operating Systems: Introduction- Issues – Communication Primitives – Inherent Limitations –Lamport's Logical Clock , Vector Clock, Global State , Cuts – Termination Detection – Distributed Mutual Exclusion – Non Token Based Algorithms – Lamport's Algorithm - Token Based Algorithms –Distributed Deadlock Detection – Distributed Deadlock Detection Algorithms – Agreement Protocols

UNIT III
Distributed Resource Management – Distributed File Systems – Architecture – Mechanisms – Design Issues – Distributed shared Memory – Architecture – Algorithm – Protocols – Design Issues – Distributed Scheduling – Issues – Components – Algorithms.

UNIT IV
Failure Recovery and Fault Tolerance – Concepts – Failure Classifications – Approaches to Recovery – Recovery in Concurrent Systems – Synchronous and Asynchronous Check pointing and Recovery –Check pointing in Distributed Database Systems – Fault Tolerance Issues – Two-Phase and Nonblocking Commit Protocols – Voting Protocols – Dynamic Voting Protocols.

UNIT V
Multiprocessor and Database Operating Systems –Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory management – Reliability/Fault Tolerance – Database Operating Systems – concepts – Features of Android OS, Ubuntu, Google Chrome OS and Linux operating systems.

Text Books
1. MukeshSinghalN.G.Shivaratri, "Advanced Concepts in Operating Systems", McGraw Hill 2000.
2. Distributed Operating System – Andrew S. Tanenbaum, PHI.

Reference Books
1. Abraham Silberschatz, Peter B.Galvin, G.Gagne, "Operating Concepts", 6th Edition Addison Wesley publications 2003.
2. Andrew S.Tanenbaum, "Modern Operating Systems", 2nd Edition Addison Wesley 2001

Outcomes

□ Clear understanding on several resource management techniques like distributed shared memory and other resources

□ Knowledge on mutual exclusion and Deadlock detection of Distributed operating system.

□ Able to design and implement algorithms of distributed shared memory and commit protocols

□ Able to design and implement fault tolerant distributed systems.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	0	2	3	3	3
CO2	3	2	2	2	2
CO3	2	3	2	2	3
CO4	2	2	3	2	3
CO5	2	0	2	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

CC IV DATA MINING

Objective
To introduce the fundamental concepts of Data Mining Techniques and various Algorithms used for Information Retrieval from Datasets.

Unit I
Data Mining And Data Preprocessing: Data Mining – Motivation – Definition – Data Mining on Kind of Data –Functionalities – Classification – Data Mining Task Primitives – Major Issues in Data Mining – Data Preprocessing – Definition – Data Clearing – Integration and Transformation – Data Reduction.

Unit II
Data Warehousing: Multidimensional Data Model –Data Warehouse Architecture – Data Warehouse Implementation –From data Warehousing to Data Mining – On Line Analytical Processing - On Line Analytical Mining.

Unit III
Frequent Patterns, Associations And Classification: The Apriori Algorithm – Definition of Classification and Prediction – Classification by Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Lazy Learners – K-Nearest Neighbor – Other Classification Methods.

Unit IV
Cluster Analysis: Definition – Types of data in Cluster Analysis – Categorization of major Clustering Techniques – Partitioning Methods – Hierarchical Clustering – BIRCH - ROCK – Grid Based Methods – Model Based Clustering Methods – Outlier Analysis.

Unit V
Spatial, Multimedia, Text And Web Data: Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web – Data Mining Applications – Trends in Data Mining.

Text Books
1. Jiawei Han and Micheline Kamber, "Data Mining: Concepts and Techniques (The Morgan Kaufmann Series in Data Management Systems) 3rd Edition, July 6, 2011.
2. Ian H. Witten, Eibe Frank, Mark A. Hall, "Data Mining: Practical Machine Learning Tools and Techniques", Elsevier; Third edition, 2014.

References
1. Margret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2003.
2. M. Awad, Latifur Khan, Bhavani Thuraisingham, Lei Wang, "Design and Implementation of Data Mining Tools", CRC Press-Taylor & Francis Group, 2015.
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "Introduction to Data Mining-Instructor's Solution Manual", Pearson Education, First Edition, 2016.
4. Mohammed J.Zaki, Wagner Meira JR, "Data Mining and Analysis: Fundamental Concepts and Algorithms", Cambridge India, 2016.

Outcome

After completing this course, students will be familiar with basic data mining concepts for solving real world problems.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	0	2	3	3	3
CO2	3	2	2	2	2
CO3	2	3	2	2	2
CO4	2	2	3	2	3
CO5	2	2	2	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

CP I - ADVANCED JAVA PROGRAMMING LAB

1. WAP to swap two numbers without using third variable.

2. WAP to check whether a number is Armstrong or not.

3. WAP to implement the Concept of Function Overloading.

4. WAP to implement the Concept of Function Overriding.

5. WAP to implement the Exceptional Handling.

6. WAP of an applet that receives two numerical values as the input from user and displays the sum of these two numbers.

7. WAP for displaying product list along with their prices and then allow user to buy any1 item from them with required quantity.

8. WAP to implement multithreading(three threads using single run method).

9. WAP to implement the calculator.

10. WAP to implement the URL.

OUTCOMES
After completing the Course successfully, the student will be able to
1. Explain basic principles of Java programming language
2. Define and demonstrate the use of built-in data structures "lists" and
3. "dictionary".
4. Design and implement a program to solve a real world problem.
5. Design and implement GUI application and how to handle exceptions and files.

Make database connectivity in Java programming language.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	0	2	3	3	3
CO2	3	2	2	2	2
CO3	2	3	2	2	3
CO4	2	2	3	2	3
CO5	2	0	2	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

CC V- PROGRAMMING IN PYTHON

COURSE OBJECTIVES

☐ To understand the basic components of computer programming using the Python language

☐ To demonstrate significant experience with the Python program development environment

UNIT-I

Introduction to Python - Why Python - Installing in various Operating Systems - Executing Python Programs - Basic Programming concepts - Variables, expressions and statements - Input/ Output – Operators.

UNIT-II

Conditions - Functions - Arguments - Return values - Iteration - Loops - Strings - Data Structures - Lists - Dictionaries - Tuples - Sequences - Exception Handling.

UNIT-III

File Handling - Modules - Regular Expressions - Text handling - **O**bject Oriented Programming - Classes - Objects - Inheritance - Overloading - Polymorphism Interacting with Databases - Introduction to MySQL - interacting with MySQL - Building a address book with add/edit/delete/search features.

UNIT-IV

Introduction to Graphics programming - Introduction to GTK - PyGTK - Developing GUI applications using pyGTK - Scientific Programming using NumPy / SciPy - Image Processing - Processing multimedia files -Network Programming, Web services using SOAP, Introduction to Graphics programming - PyGame

UNIT-V

Introduction to Version Control Systems - Subversion/Git, Writing Unit Tests, Creating Documentation, Contributing to Open Source Projects

TEXT BOOK

1. Allen B. Downey, ”Think Python: How to Think Like a Computer Scientist“,1st Edition 2012, O’Reilly.

REFERENCE BOOKS

1. Jeff McNeil ,”Python 2.6 Text Processing: Beginners Guide”, 2010 ,Packet Publications

2. Mark Pilgrim ,”Dive Into Python “ , 2nd edition 2009, Apress

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Explain basic principles of Python programming language
2. Define and demonstrate the use of built-in data structures “lists” and “dictionary”.
3. Design and implement a program to solve a real world problem.
4. Design and implement GUI application and how to handle exceptions and files.
5. Make database connectivity in python programming language.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	3	2	2
CO3	3	3	2	3	3
CO4	3	2	3	2	2
CO5	2	3	3	3	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

CC VI - INTERNET OF THINGS

Objective

In order to gain knowledge on bases of Internet of Things (IoT), IoT Architecture, and the Protocols related to IoT; and understand the concept of the Web of Thing and the relationship between the IoT and WoT

UNIT I
INTRODUCTION To IoT: Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels and Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.

UNIT II
IoT ARCHITECTURE: M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

UNIT III
IoT PROTOCOLS: Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP - Security

UNIT IV
WEB OF THINGS: Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

UNIT V
APPLICATIONS: The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging.

Text Books
1.Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
3. Jan Ho¨ ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
4. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010.
5. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012.

Outcomes

At the end of this course, students should be able to

☐ Gain the basic knowledge about IoT and they will be able to use IoT related products in real life. ☐ It helps to rely less on physical resources and started to do their work smarter.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	0	2	3	3	3
CO2	3	2	2	2	2
CO3	2	3	2	2	3
CO4	3	2	3	3	3
CO5	2	0	2	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

CP II –PYTHON PROGRAMMING LAB

1) Write a Python program to find GCD of two numbers.

2) Write a Python Program to find the square root of a number by Newton's Method

3) Write a Python program to find the exponentiation of a number.

4) Write a Python Program to find the maximum from a list of numbers.

5) write a Python Program to perform Linear Search

6) write a Python Program to perform Binary Search

7) Write a Python Program to perform selection sort.

8) Write a Python Program to perform insertion sort.

9) Write a Python Program to perform Merge sort.

10) Write a Python program to find first n prime numbers

COURSE OUTCOMES
After completing the Course successfully, the student will be able to
1. Explain basic principles of Python programming language
2. Define and demonstrate the use of built-in data structures "lists" and "dictionary".
3. Design and implement a program to solve a Python programs and sorting.
4. Design and implement GUI application and how to handle exceptions and files.
5. Make database connectivity in python programming language.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	2	2	2
CO3	3	3	2	3	3
CO4	3	2	3	2	2
CO5	2	3	3	3	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels

EC I - MOBILE COMPUTING

Objectives
☐ Understand the basic concepts of mobile
☐ Be familiar with GPRS Technology
☐ system Be exposed to Ad-Hoc networks
☐ Gain knowledge about different mobile platforms and application development

Unit 1
Basics of mobile - Mobile device profiles - Middleware and gateways - Wireless Internet - Smart clients - Three-tier Architecture- Design considerations for mobile computing–– Mobility and Location based services.

Unit -2
Mobile computing through Internet - Mobile-enabled Applications - Developing Mobile GUIs – VUIs and Mobile Applications – Characteristics and benefits - Multichannel and Multi modal user interfaces – Synchronization and replication of Mobile Data - SMS architecture – GPRS – Mobile Computing through Telephony.

Unit -3
Mobile Application Development - Android- wi-fi –GPS – Camera – Movement – orientation - event based programming – iOS/ windows CE - Blackberry – windows phone – M-Commerce- structure – pros & cons – Mobile payment system - J2ME

Unit -4
ADHOC Wireless Network - Ad Hoc Wireless Network –MAC protocol – Routing protocols - Transport Layer Protocol - QoS – Energy Management – application design – work flow – composing applications – Dynamic linking – Intents and Services – Communication via the web.

Unit -5
Security and Hacking - Password security – Network security – web security – Database security **-** Wireless Sensor Network - Architecture and Design – Medium Access Control – Routing – Transport Layer – Energy model.

Text Books
1. Jochen Schiller, Mobile Communications, Second Edition,2012.

2. William Stallings,"Wireless Communications & Networks", Pearson Education, 2009.

References
1. C.Siva Ram Murthy, B.S. Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", 2nd Edition, Pearson Education. 2004

2. Ashok K Talukder, Roopa R Yavagal, "Mobile Computing", Tata McGraw Hill, 2005.

3. Jochen Burkhardt Dr.Horst Henn, Klaus Rintdoff,Thomas Schack, "Pervasive Computing", Pearson, 2009.

4. Fei Hu , Xiaojun Cao, " Wireless Sensor Networks Principles and Practice " CRC Press, 2010.

Outcomes

☐ Able to explain the basics of mobile system
☐ Able to develop mobile application
☐ Understand the Mobile Ad hoc networks and its routing
☐ Understand the different types of security features

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	1	2	1
CO3	3	3	1	3	3
CO4	3	2	3	2	2
CO5	2	3	3	2	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

EC II- DIGITAL IMAGE PROCESSING

Objectives

To provide complete knowledge on Digital Image Processing methods, such as image processing methods in Spatial domain and Frequency domain, Edge detection, Compression, Segmentation, and Morphological concepts, which enable the students to understand the concepts and implement them empirically.

UNIT–I
Fundamentals: Image Sensing and Acquisition, Image Sampling and Quantization, relationship between Pixels; Random noise; Gaussian Markov Random Field, σ-field, Linear and Non-linear Operations; Image processing models: Causal, Semi-causal, Non-causal models.
Color Models: Color Fundamentals, Color Models, Pseudo-color Image Processing, Full Color Image Processing, Color Transformation, Noise in Color Images.
UNIT–II
Spatial Domain: Enhancement in spatial domain: Point processing; Mask processing; Smoothing Spatial Filters; Sharpening Spatial Filters; Combining Spatial Enhancement Methods.
Frequency Domain: Image transforms: FFT, DCT, Karhunen-Loeve transform,Hotlling's T_2 transform, Wavelet transforms and their properties. Image filtering in frequency domain.
UNIT–III
Edge Detection: Types of edges; threshold; zero-crossing; Gradient operators: Roberts, Prewitt, and Sobel operators; residual analysis based technique; Canny edge detection. Edge features and their applications.
UNIT–IV
Image Compression: Fundamentals, Image Compression Models, Elements of Information Theory. Error Free Compression: Huff-man coding; Arithmetic coding; Wavelet transform basedcoding; Lossy Compression: FFT; DCT; KLT; DPCM; MRFM based compression; Wavelet transform based; Image Compression standards.

UNIT–V
Image Segmentation: Detection and Discontinuities: Edge Linking and Boundary Deduction; Threshold; Region-Based Segmentation. Segmentation by Morphological watersheds. The use of motion in segmentation, Image Segmentation based on Color.
Morphological Image Processing: Erosion and Dilation, Opening and Closing, Hit-Or-Miss Transformation, Basic Morphological Algorithms, Gray-Scale Morphology.
Text Books
1. Rafael Gonzalez, Richard E. Woods, "Digital Image Processing", Fourth Edition, PHI/Pearson Education, 2013.

2. A. K. Jain, Fundamentals of Image Processing, Second Ed., PHI, New Delhi, 2015.

References

1. B. Chan la, D. Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2003.

2. Nick Elford, "Digital Image Processing a practical introducing using Java", Pearson Education, 2004.

Outcomes
- Able to explain the basics of digital image processing
- Able to develop Mask processing; Smoothing Spatial Filters;
- Understand the image compression
- Understand the image segmentation

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	1	2	1
CO3	3	3	1	3	3
CO4	3	2	3	2	2
CO5	2	3	3	2	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

CC VII - COMPILER DESIGN

Objectives
☐ Discover principles, algorithms and techniques that can be used to construct various phases of compiler.
☐ Acquire knowledge about finite automata and regular expressions
☐ Learn context free grammars, compiler parsing techniques.
☐ Explore knowledge about Syntax Directed definitions and translation scheme
☐ Understand intermediate machine representations and actual code generation

Unit – I
Lexical analysis - Language Processors, The Structure of a Compiler, Parameter passing mechanism – Symbol table - The role of the lexical analyzer - Input buffering - Specification of tokens - Recognition of tokens – Finite automata - Regular expression to automata.

Unit – II
Syntax Analysis - The role of the parser - Context-free grammars - Writing a grammar - Top down Parsing - Bottom-up Parsing - LR parsers - LALR parsers.

Unit – III
Semantic Analysis - Inherited and Synthesized attributes – Dependency graphs – Ordering the evaluation of attributes – S-attributed definitions – L-attributed definitions – Applications of Syntax Directed translation – Syntax Directed translations schemes - Storage organization – Stack allocation of space.

Unit – IV
Intermediate Code Generation - Variants of Syntax trees – Three Address code – Types and Declarations - Translation of Expressions – Type checking - Control flow - Back patching - Switch Statements - Procedure calls.

Unit – V
Code Generation and Code Optimization - Issues in the design of a code generator - The target language – Address in the Target Code – Basic Block and Flow graphs – Optimization of Basic Blocks - A simple code generator – Peephole Optimization.

Text Book
1. Alfred V. Aho, Monica S.Lam, Ravi Sethi and Jeffrey D. Ullman, "Compilers-Principles, Techniques and Tools", Second Edition, Pearson Education Asia, 2009.

References
1. A.V. Aho, Ravi Sethi, J.D. Ullman, Compilers - Principles, Techniques and Tools, Addison- Wesley, 2003.
2. Fischer Leblanc, Crafting Compiler, Benjamin Cummings, Menlo Park, 1988.
3. Kennath C.Louden, Compiler Construction Principles and Practice, Vikas publishing House, 2004.
4. Allen I. Holub, Compiler Design in C, Prentice Hall of India, 2001.

Outcome

On the successful completion of this course, Students will be able to:
 Use the knowledge of patterns, tokens & regular expressions for solving a problem in the field of data mining.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	2	3	2
CO3	2	3	2	2	3
CO4	3	2	2	2	3
CO5	3	3	2	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

EC IV - Software Project management

Objectives
This course will enable students to:
 Understand the framework of project management
 Learn to monitor and control the project
 Know the sound knowledge in Agile method
 Know the team, cost, quality and resource management
 Identify and control the risk in the projects

Unit I
Project Management Framework: Introduction: Project - Project management - Relationship among Project, Program and Portfolio management - Project and operations management- Role of project manager - Project management body of knowledge - Enterprise Environmental factors. Project life cycle and Organization: Overview of project life cycle - Projects vs Operational Work - Stakeholders - Organizational influences on project management. **The Standard for Project Management of a Project**: Project management processes for a project: Common project management process interactions - Projects management process groups - Initiating process group - planning process group - Executing process group - Monitoring and controlling process group - Closing process group.

Unit II
Choosing Methodologies and Technologies – Software Processes and Process Models – Choice of Process Models – The Waterfall Model– Prototyping – other ways of categorizing prototype - **Agile Methods** – Extreme Programming Selecting the Most Appropriate Process Model- Need of Agile - Iterative vs Incremental-Agile Manifesto and Mindset – Lean, Scrum and Kanban methods-uncertainty, Risk, and lifecycle selection-Scrum Elements overview-5 levels of planning-Scrum Process overview-Agile Team-roles and responsibilities- Epic-feature-User Stories-PBI-The Sprint.

Unit III
The Project Management Knowledge Areas: Project integration management: Develop project charter - Develop project management plan - Direct and manage project execution - Monitor and control project work - Perform integrated change control - Close project or phase. Project scope management: Collect requirements - Define Scope - Create WBS - Verify Scope - Control Scope. Project team management: Define activities - Sequence activities - Estimate activity resources - Estimate Activity Durations - Develop Schedule - Control Schedule.

Unit IV
Project cost management: Estimate costs - Determine budget - Control costs. Project Quality Management: Plan quality - perform quality assurance - Perform quality control. Project Human Resource Management: Develop human resource plan - Acquire project team - Develop project team - Manage project team. Project Communications Management: Identify stakeholders - Plan communications - Distribute information - Manage stakeholder expectations - report performance.

Unit V
Project Risk Management: Plan risk management - Identify risks - Perform qualitative risk analysis - Perform quantitative risk analysis - plan risk responses -

Monitor and control risks. Project Procurement Management: Plan - Conduct - Administer - Close procurements.

Text Book

1. "A guide to the Project management Body of Knowledge (PMBOK Guide)" Fouth Edition, Project Management Institute, Pennsylvania, 2008

2. BOB Huges, Mike Cotterell, Rajib Mall "Software Project Management", McGraw Hill, Fifth Edition,2011.

3. Emerson, "Agile Handbook," Philosophie

Reference books

1. Futrell, "Quality Software Project Management", Pearson Education India.

2. Royce, "Software Project Management", Pearson Education India.

Outcomes

 Able to explain the basics of software project management

 Able to develop software process and Agile methods;

 Understand the project management knowledge management

 Understand the project risk management

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	2	3	2
CO3	3	3	2	2	2
CO4	2	2	2	3	3
CO5	3	3	3	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

CP III – WEB TECHNOLOGY LAB

1. Write a XML program for job listing in HTML

2. Write a JavaScript code block, which checks the contents entered in a form's text element. If the text entered is in the lower case, convert to upper case.

3.Write a JavaScript code block, which validates a username and password.

a) If either the name or password field is not entered display an error message.

b) The fields are entered do not match with default values display an error message.

c) If the fields entered match, display the welcome message.

4. Write a JavaScript code to browser

5. Write a JSP Program for user authentication.

6. Write a JSP Program for a simple shopping cart.

7. Write a JSP Program to prepare a bio data and store it in database.

8. Write an ASP Program using Response and Request Object.

9. Write an ASP Program using Ad Rotator Component.

10. Write an ASP program using database connectivity for student's record.

Outcomes
On the successful completion of this course, Students will be able to:
 Design a web page with Web form fundamentals and web control classes
 Recognize the importance of validation control, cookies and session
 Apply the knowledge of ASP.NET object, ADO.NET data access and SQL to develop a client server model.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	2	3	2
CO3	3	3	2	2	2
CO4	2	2	2	3	3

CO5	3	3	3	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

EC III - CLOUD COMPUTING

Objective

The objective of this course is to provide students with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations. Another objective is to expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

UNIT - I
COMPUTING BASICS
Cloud computing definition- Characteristics- Benefit-Challenges- Distributed Systems- Virtualization-Service-oriented computing- Utility-oriented computing- Building Cloud Computing environments- computing platforms & technologies - Cloud Models – Cloud Service Examples - Cloud Based Services & Applications - Cloud concepts and Technologies.

UNIT - II
VIRTUALIZATION, CLOUD SERVICES AND PLATFORMS
Virtualization:Virtualization- Characteristics- taxonomy-types- Pros and Cons-Examples Architecture: Reference model- types of clouds- Compute Service - Storage Services - Cloud Database Services - Application Services - Content Delivery Services - Analytics Services - Deployment And Management Service - Identity And Access Management Services - Open Source Private Cloud Software.

UNIT – III
CLOUD APPLICATION DESIGN AND DEVELOPMENT
Design consideration- Reference Architecture for Cloud Application - Cloud Application Design Methodologies - Data Storage Approaches- Development in Python: Design Approaches – Application: Image Processing - Document Storage - Map Reduce - Social Media Analytics.

UNIT – IV
PYTHON FOR CLOUD
Introduction- Installing Python- Data types & Data Structures- Control Flow-Functions- Modules- Packages- File Handling-Date/Time Operations – Classes-Python for Cloud: Amazon Web Services –Google Cloud Platform - Windows Azure –Map Reduced –Packages of Interest – Designing a RESTful Web API.

UNIT – V
BIG DATA ANALYTICS, MULTIMEDIA CLOUD & CLOUD SECURITY
Big Data Analytics: Clustering Big data - Classification of Big Data – Recommendation systems. Multimedia Cloud: Case Study: Live Video Stream App - Streaming Protocols – Case Study: Video Transcoding App-Cloud Security: CSA Cloud Security Architecture - Authentication - Authorization - Identity and Access management - Data Security - Key Management- Auditing- Cloud for Industry, Healthcare & Education.

Text Books
1. Buyya, Vecciola and Selvi, Mastering Cloud Computing: Foundations and Applications Programming, Tata McGraw Hill, 2013.
2. ArshdeepBahga, Vijay Madisetti, "Cloud Computing: A Hands – On Approach" Universities press (India) Pvt. limited 2016.

References:
1. Rittinghouse and Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, 2016.
2. Michael Miller "Cloud Computing Web based application that change the way you work and collaborate online". Pearson edition, 2008.
3. Kris Jamsa, Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile,Security and More, Jones & Bartlett Learning, 2012.

Outcomes
At the end of this course, students should be able to
□ Gain the basic knowledge about cloud computing and they will be able to use cloud computing related products in real life.

□ It helps to application of cloud computing, multimedia cloud and big data analysis.

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OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	0	2	3	3	3
CO2	3	2	2	2	2
CO3	2	3	2	2	3
CO4	3	2	3	3	3
CO5	2	0	2	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

CC VIII- ADVANCED WEB TECHNOLOGY

Objectives
- Explore the backbone of web page creation by developing .NET skill.
- Enrich knowledge about HTML control and web control classes
- Provide depth knowledge about ADO.NET
- Understand the need of usability, evaluation methods for web services

Unit - I
OVERVIEW OF ASP.NET - The .NET framework – Learning the .NET languages Data types – Declaring variables- Scope and Accessibility- Variable operations- Object Based manipulation- Conditional Structures- Loop Structures- Functions and Subroutines. Types, Objects and Namespaces : The Basics about Classes- Value types and Reference types- Advanced class programming- Understanding name spaces and assemblies. Setting Up ASP.NET and IIS .

Unit – II
Developing ASP.NET Applications - ASP.NET Applications: ASP.NET applications– Code behind- The Global.asax application file- Understanding ASP.NET Classes- ASP.NET Configuration. Web Form fundamentals: A simple page applet- Improving the currency converter- HTML control classes- The page class- Accessing HTML server controls. Web controls: Web Control Classes – Auto PostBack and Web Control events- Accessing web controls. Using Visual Studio.NET: Starting a Visual Studio.NET Project- Web form Designer- Writing code- Visual studio.NET debugging. Validation and Rich Controls: Validation- A simple Validation example- Understanding regular expressions- A validated customer form. State management - Tracing, Logging, and Error Handling.

Unit – III
Working with Data - Overview of ADO.NET - ADO.NET and data management- Characteristics of ADO.NET-ADO.NET object model. ADO.NET data access : SQL basics– Select , Update, Insert, Delete statements- Accessing data- Creating a connection- Using a command with a DataReader - Accessing Disconnected data - Selecting multiple tables – Updating Disconnected data. Data binding: Single value Data Binding- Repeated value data binding- Data binding with data bases. Data list – Data grid – Repeater – Files, Streams and Email – Using XML

Unit - IV
Web Services - Web services Architecture : Internet programming then and now-WSDL–SOAP- Communicating with a web service-Web service discovery and UDDI. Creating Web services : Web service basics- The StockQuote web service – Documenting the web service- Testing the web service- Web service Data types-ASP.NET intrinsic objects. Using web services: Consuming a web service- Using the proxy class- An example with TerraService.

Unit – V
Advanced ASP.NET - Component Based Programming: Creating a simple component – Properties and state- Database components- Using COM

components. Custom controls: User Controls- Deriving Custom controls. Caching and Performance Tuning: Designing and scalability– Profiling- Catching- Output catching- Data catching. Implementing security: Determining security requirements- The ASP.NET security model- Forms authentication- Windows authentication.

Text Book

1. 1 Mathew Mac Donald, "ASP.NET Complete Reference", TMH 2005.

References

1. Crouch Matt J, "ASP.NET and VB.NET Web Programming", Addison Wesley 2002.

2. J.Liberty, D.Hurwitz, "Programming ASP.NET", Third Edition, O'REILLY, 2006.

Outcomes

On the successful completion of this course, Students will be able to:

☐ Design a web page with Web form fundamentals and web control classes

☐ Recognize the importance of validation control, cookies and session

☐ Apply the knowledge of ASP.NET object, ADO.NET data access and SQL to develop a client server model.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	2	3	2
CO3	2	3	2	2	3
CO4	2	2	2	3	3
CO5	3	3	2	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

CC IX- PHP PROGRAMMING

COURSE OBJECTIVES
• To learn and use open source database management system MySQL
• To create dynamic web pages and websites.
• To connect web pages with database.

UNIT I
Basic development Concepts – Creating first PHP Scripts – Using Variable and Operators – Storing Data in variable – Understanding Data types – Setting and Checking variables Data types – Using Constants – Manipulating Variables with Operators.

UNIT II
Writing Simple Conditional Statements - Writing More Complex Conditional Statements – Repeating Action with Loops – Working with String and Numeric Functions.

UNIT III
Storing Data in Arrays – Processing Arrays with Loops and Iterations – Using Arrays with Forms - Working with Array Functions – Working with Dates and Times.

UNIT IV
Creating User-Defined Functions - Creating Classes – Using Advanced OOP Concepts. Working with Files and Directories: Reading Files- Writing Files- Processing Directories.

UNIT V
Introducing Database and SQL- Using MySQL-Adding and modifying Data- Handling Errors – sing SQLite Extension and PDO Extension.
Introduction XML - Simple XML and DOM Extension.

TEXT BOOK
1. VIKRAM VASWANI- PHP A Beginner's Guide, Tata McGraw-Hill
REFERENCE BOOKS
1. The PHP Complete Reference – Steven Holzner – Tata McGraw-Hill Edition.

COURSE OUTCOMES
After completing the Course successfully, the student will be able to

      1.Explain basic principles of Python programming language

      2.Define and demonstrate the use of built-in data structures "lists" and "dictionary".

      3.Design and implement a program to solve a real world problem.

      4.Design and implement GUI application and how to handle exceptions and files.

      5.Make database connectivity in python programming language.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	1	2	1
CO3	3	3	1	3	3
CO4	3	1	3	2	2
CO5	2	3	3	3	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

CC X- MACHINE LEARNING

Objectives
☐ To Learn about Machine Intelligence and Machine Learning applications
☐ To implement and apply machine learning algorithms to real-world applications.
☐ To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems.
☐ To understand how to perform evaluation of learning algorithms and model selection

UNIT I
INTRODUCTION
Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II
NEURAL NETWORKS AND GENETIC ALGORITHMS :Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III
BAYESIAN AND COMPUTATIONAL LEARNING : Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV
INSTANT BASED LEARNING : K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

UNIT V
ADVANCED LEARNING :
Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

TEXT BOOK
1. Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.

REFERENCES
1. EthemAlpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.

2. Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
3. Michael Affenzeller, Stephan Winkler, Stefan Wagner, Andreas Beham, "Genetic Algorithms and Genetic Programming", CRC Press Taylor and Francis Group.

1. **REFERENCE BOOK** K.P. Soman , Shyam Diwakar, V.Ajay "Insight into Data Mining Theory

   Practice ", Prentice Hall of India Pvt. Ltd, New Delhi

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1.Explain basic principles of machine learning

2.Define Neural Network Representation – Problems

3.Define Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle

4.Design and implement K- Nearest Neighbour Learning, advanced learning

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	0	2	3
CO3	3	3	2	3	3
CO4	3	0	3	2	2
CO5	2	3	3	3	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

CP IV – PHP PROGRAMMING LAB

1.Write a program to find the factorial of a number.

2.Write a program using Conditional Statements.

3. Write a program to find the maximum value in a given multi dimensional array

4. Write a program to find the GCD of two numbers using user-defined functions.

5. Design a simple web page to generate multiplication table for a given number.

6. Design a web page that should compute one's age on a given date.

7. Write a program to download a file from the server.

8. Write a program to store the current date and time in a COOKIE and display the

Last Visited' date and time on the web page.

9. Write a program to store page views count in SESSION, to increment the count

on each refresh and to show the count on web page.

10. Write a program to draw the human face.

11. Write a program to design a simple calculator.

12. Design an authentication web page in PHP with MySQL to check username

COURSE OUTCOMES
After completing the Course successfully, the student will be able to
1.Explain basic principles of Python programming language
2.Define and demonstrate the use of built-in data structures "lists" and "dictionary".
3.Design and implement a program to solve a real world problem.
4.Design and implement GUI application and how to handle exceptions and files.
5.Make database connectivity in python programming language.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
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CO5	2	3	3	2	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

EC V- SOFT COMPUTING

Objectives

 Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.

 Introduce students to artificial neural networks and fuzzy theory from an engineering perspective.

UNIT I

Introduction: Soft Computing Constituents – Soft Computing Vs Hard Computing – Characteristics - Applications - Artificial Neural Network (ANN): Fundamental Concept – Application Scope - Basic Terminologies – Neural Network Architecture – Learning Process – Basic Models of ANN: McCulloch-Pitts Model – Hebb Network – Linear Separability.

UNIT II

Supervised Learning Networks: Perceptron Networks – Adaline and Madaline Networks – Back Propagation Network – Radial Basis Function Network. Associative Memory Networks – BAM - Hopfield Network - Boltzmann Machine. Unsupervised Learning Networks: Kohonen Self Organizing Network – Counter Propagation Network – ART Network.

UNIT III

Fuzzy Sets: Basic Concept – Crisp Set Vs Fuzzy Set - Operations on Fuzzy Set – Properties of Fuzzy Sets – Fuzzy Relations: Concept – Fuzzy Composition – Fuzzy Equivalence and Tolerance Relation - Membership Functions: Features – Fuzzification – Methods of Membership value assignments – Defuzzification – Methods.

UNIT IV

Fuzzy Arithmetic – Extension Principle – Fuzzy Measures – Fuzzy Rules and Fuzzy Reasoning: Fuzzy Propositions – Formation of Rules – Decomposition of Rules – Aggregation of Rules – Approximate Reasoning – Fuzzy Inference and Expert Systems – Fuzzy Decision Making – Fuzzy Logic Control Systems.

UNIT V

Genetic Algorithm: Fundamental Concept – Basic Terminologies – Traditional Vs Genetic Algorithm - Elements of GA - Encoding - Fitness Function – Genetic Operators: Selection – Cross Over - Inversion and Deletion - Mutation – Simple and General GA – The Schema Theorem - Classification of Genetic Algorithm – Genetic Programming – Applications of GA.

Text Book

1. S.N. Sivanandam, S.N. Deepa, "Principles of Soft Computing", Wiley India, 2007.

Reference Book

1. S. Rajasekaran, G.A.V. Pai, "Neural Networks, Fuzzy Logic, Genetic Algorithms", Prentice Hall India, 2004.

Outcomes

Upon completion of the course, the student are expected to

☐ Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.

☐ Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic

☐ To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Explain basic principles of Python programming language
2. Define and demonstrate the use of built-in data structures "lists" and "dictionary".
3. Design and implement a program to solve a real world problem.
4. Design and implement GUI application and how to handle exceptions and files.
5. Make database connectivity in python programming language.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	2	3	2
CO3	2	3	2	3	3
CO4	3	2	3	2	2
CO5	2	3	2	3	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)