MOTHER TERESA WOMEN'S UNIVERSITY KODAIKANAL – 624 102

M.Sc. INFORMATION TECHNOLOGY

Syllabus
(With Effect from 2021)

DEPARTMENT OF COMPUTER SCIENCE

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL

DEPARTMENT OF COMPUTER SCIENCE

CHOICE BASED CREDIT SYSTEM (CBCS)
(2021-2022 ONWARDS)

M.Sc. INFORMATION TECHNOLOGY
(M.Sc. IT)

About the Programme

Master of Science in Information Technology (M.Sc. IT) is a 2-year post-graduate programme. It aims to provide theoretical as well as practical knowledge on topics like software development, data mining, computer systems, analytics etc. This programme is designed to help students explore different types of technology and the way in which information is created exchanged and stored. The M.Sc. IT programme enables the students in providing knowledge of programming, implementation of common data structures using OOP principles in C++ and ADTs. Students may learn how to write code and can explore areas such as information security software applications system design and databases.

The programme offers a broad technical understanding of current and evolving technologies in the IT field. The emphasis of the programme is moving technology from the laboratory to the realm of business development and provides job opportunities in a broader spectrum in the following areas: Senior Network Engineer, Security Consultant (IT), Software Test Lead., Technical Consultant, Senior Software Programmer, Software Product Manager and still ore.

Eligibility: B.Sc. CS / B.C.A. / B.Sc. IT

PROGRAMME EDUCTIONAL OBJECTIVES (PEOS)

PEO1: Create a strong IT foundation towards professional career or entrepreneurship
PEO2: Implement computing solutions in the real world problems
PEO3: Equip and apply research on new innovations in IT
PEO4: Pertain knowledge on societal impacts of Information Technology
PEO5: Construct Strong Communication and broad knowledge of global perspectives in IT

General Guidelines for PG Programme:

1. Duration: The programme shall extend through a period of 4 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

2. Medium of Instruction: English

3. Evaluation: Evaluation of the candidates shall be through Internal and External assessment. The ratio of formative and summative assessment should be 25:75 for both Core and Elective papers.

	Theory		Practical	
	Min	**Max**	**Min**	**Max**
Internal	**13**	**25**	**13**	**25**
External	**38**	**75**	**38**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz (5) = 25**
- **External Theory: 75**

Question paper pattern for External examination for Core and Elective papers:

Max. Marks: 75   **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions - 2 Questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either /or)	**20**
3	**C**	**3*15=45** (Open Choice) (Any three Questions out of 5 - one Question from each Unit)	**45**
		Total Marks	**75**

Project Report

A student should select a topic for the Project Work at the end of third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages.

Evaluation:

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks, Viva: 75 Marks)

Minimum credits required to pass - 90.

4. Conversion of Marks to Grade Points and Letter Grade

(Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good

60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

5. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance should apply for condonation in the prescribed form with prescribed fee. Students with 65% to 70% of attendance should apply for condonation in the prescribed form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

6. Any Other Information:

In addition to the above regulations, any other common regulations pertaining to the PG Programmes are also applicable for this programme.

Maternity Leave – The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and The Registrar.

PROGRAMME OUTCOMES (POs):
On completion of the programme, the students will

PO1: Understand and apply mathematical formulation, networking & domain knowledge for computing systems

PO2: Ability to identify, analyse and formulate complex computing problems

PO3: Implement modern computing tools and techniques in real world problems

PO4: Engage in independent and life-long learning for professional development.

PO5: Identify & recognize societal & environmental concern involved in the use of IT

PROGRAMME SPECIFIC OUTCOMES (PSOs):

On completion of the programme, the students will be able to

PSO1: Analyze the appropriate IT infrastructure required for project implementation

PSO2: Design, develop and test software solutions for solving real world problems

PSO3: Explore and apply technical knowledge for societal development

PSO4: Ability to manage and handle networking issues in computing systems

M.SC IT CURRICULUM

S.NO	Course Code	Course Title	Credits	Hours L	Hours P	Int	Ext	Total
SEMESTER – I								
1	P21ITT11	**Core 1** : Advanced Java Programming	4	5	-	25	75	100
2	P21ITT12	**Core 2** : Data Structures and Algorithms	4	5	-	25	75	100
3	P21ITT13	**Core 3** : Network And Internet Security	4	5	-	25	75	100
4	P21ITT14	**Core 4**: Advanced Computer Architecture	4	5	-	25	75	100
5	P21ITP11	**Core 5**: Computing-Lab1 (Advanced JAVA Programming & Data Structures and Algorithms)	4	-	6	25	75	100
6	P21CSS11	**Supportive Course I**: Computer Skills for Web Designing and Video Editing	2	-	4	25	75	100
			22	**30**				**600**
Semester II								
7	P21ITT21	**Core 6**: Python Programming	4	5	-	25	75	100
8	P21ITT22	**Core 7**: Artificial Intelligence	4	5	-	25	75	100
9	P21ITT23	**Core 8**: Data Mining and Warehousing	4	4	-	25	75	100
10	P21ITT24	**Core 9**: Distributed Computing	4	4	-	25	75	100
11	P21ITP22	**Core 10**: Computing-Lab2 (Python and Data Mining Lab)	4	-	6	25	75	100
12		**Non-Major Elective**:	4	4	-	25	75	100
13	P21ITS22	**Supportive Course – II**: Web Programming	2	-	2	25	75	100
			26	**30**				**700**
Semester III								
14	P21ITT31	**Core 11**: Digital Image Processing	4	4	-	25	75	100
15	P21ITT32	**Core 12**: Client Server Computing	4	4	-	25	75	100
16	P21ITT33	**Core 13**: Big Data Analytics	4	4	-	25	75	100
17	P21ITT34	**Core 14**: Internet of Things	4	4	-	25	75	100
18	P21ITP33	**Core 15:** Computing-Lab3 (Digital Image Processing)	4	-	6	25	75	100
19	P21ITP34	**Core 16** : Computing-Lab4 (PHP with MYSQL)	4	-	6	25	75	100
20	P21WSS33	**Supportive Course – 3**: Women Empowerment	2	2	-	25	75	100
			26	**30**				**700**

		Semester IV						
21	P21ITE411 P21ITE412 P21ITE413	**Elective I*** **1.** Object Oriented Analysis and Design **2.** Information & System Security **3.** Computational Linguistics **4.** Any MOOC Course$	4	4	-	25	75	100
22	P21ITE421 P21ITE422 P21ITE423	**Elective II*** 1. Cloud Computing 2. Soft Computing 3. Wireless Sensor Networks 4. Any MOOC Course$	4	4	-	25	75	100
23	P21ITR41	Major Project	8	22	-	25	75	100
			16	**30**				**300**
		Total	**90**	**120**				**2300**

Non Major Elective

The candidates who have joined the PG Programme, can also undergo Non Major Elective offered by other Departments.

Non-Major Electives (NME) offered by Department of Computer Science:

S.No.	Course code	Non-Major Elective Courses
1	P21ITN211	C Programming
2	P21ITN212	Photo Designing
3	P21ITN213	Big Data Analytics
4	P21ITN214	Digital Image Processing
5	P21ITN215	Mobile Computing
6	P21ITN216	Data Communication and Networking
7	P21ITN217	Cloud Computing

Additional Credit Courses:

P21ITV11	Soft Computing Lab	I Semester – 2 Credits
P21ITI21	Internship	II Semester – 2 Credits
P21ITO31	MOOC	III Semester – 2 Credits
P21ITV42	Big Data Analytics Lab	IV Semester – 2 Credits

*Those who have CGPA as 9, and want to do the project in industry/institution during IV semester, may opt

for these two papers in III semester.

$ Students can take one 4 credit course in MOOC as elective or two 2 credit courses in MOOC as elective with

the approval of Department committee.

SEMESTER I

COURSE CODE	P21ITT11	ADVANCED JAVA PROGRAMMING	L	T	P	C
CORE -I			5	0	0	4

Cognitive Level	**K1:** Recall	**K2:** Understand	**K3:** Apply	**K4:** Analyze
Course Objectives	- To Understand the Basic Programming Concepts of Java. - To know, how to import user defined package, to create thread program and string methods. - To learn about the Input/output, Networking package classes and methods. - To learn about the Abstract Windowing Toolkit. - To learn about the Applet package classes, methods, the Basic Concepts of Remote Method Invocation, JDBC and Servlets.			

UNIT I: Applets:
Applet Fundamental – Applet Class – Applet Life Cycle – Steps for Developing An Applet Program - Passing Values Through Parameters - Graphics In An Applet-Event Handling.

UNIT II : **GUI Applications:**
Graphical User Interface - Creating Windows - Dialog Boxes-Layout Managers - AWT Component Classes - Swing Component Classes - Event Handling – AWT graphics classes.

UNIT III: Networking:
Basics Of Networking - Networking In Java - Socket Programming Using TCP/IP – Socket Programming Using UDP – URL And INET Address Classes.
Java Database Connectivity: Types Of Drivers - JDBC Architecture - JDBC Classes And Interfaces - Basic Steps In Developing JDBC Applications - Creating A New Database And Table With JDBC.

UNIT IV: Servlets:
Basics – Advantages Over Applets – Servlet Alternatives –Servlet Strengths - Servlet Architecture - Servlet Life Cycle - Generic Servlet - Http Servlet - Passing Parameters To Servlet – Server - Side Include – Cookies – Filters - Security Issues.

UNIT V: Java Server Pages:
Overview – JSP and HTTP – JSP Engines – Working Of JSP – Anatomy Of A JSP Page - JSP Syntax - Creating A Simple JSP Page - Components Of Java Server Pages - Implicit Objects – Client Side Validation Using JavaScript - Handling Request And Response.

Text Books(S):
1. Herbert Schildt -Java The Complete Reference, McGraw Hill Education, 10thEdition, New York, 2017
2. S.Horstmann, Core JAVA, Addison Wesley, 11th Edition, 2018.

Reference Books
1. Uttam K.Roy - Advanced Java Programming – Oxford University Press, 2017
2. Core and Advanced Java, Black Book – Dream tech Press, 2017

COURSE OUCOMES

CO1: Define the Applet fundamentals, GUI applications and AWT components.   K1
CO2: Discuss about Networking in java and Java database connectivity.   K2
CO3: Understand the concept of Servlets.   K2
CO4: Understand the concepts JSP and HTTP   K3
CO5: Discuss about the Web programming on client side and server side.   K4

MAPPING OF COs with POs and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	S	M	S	S	M	S
CO2	S	S	M	S	M	S	S	M	S	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S	S
CO4	M	S	M	S	S	S	M	M	S	S	S	S
CO5	S	M	S	S	M	S	M	M	M	S	S	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITT12	DATA STRUCTURES AND ALGORITHMS	L	T	P	C
CORE -II			5	0	0	4
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					
Course Objectives	• To introduce algorithm analysis framework for recursive and non-recursive algorithms • To acquire knowledge on ADTs such as List, Stack and Queue • To explore the binary trees and the priority queues with their applications • To learn the various hashing techniques, Set ADT • To get exposure on graphs, its representation, traversal and applications.					

UNIT I:
Trees: Heaps – Binary Search Trees – Selection Trees – Forests – Representation of Disjoint Sets – Counting Binary Trees.
Graphs: The Graph Abstract Data type – Elementary Graph Operations – Minimum Cost Spanning Trees – Shortest Paths and Transitive Closure – Activity Networks.

UNIT II: Hashing:
Introduction – Static hashing – Dynamic hashing – Bloom filters.
Priority Queues: Single and Double ended priority queues – Left Trees – Binomial Heaps Fibonacci Heaps – Pairing Heaps – Symmetric Min – Max Heaps – Interval Heaps.

UNIT III: Efficient binary search trees:
Optimal Binary Search Trees – AVL Trees – Red-Black Trees – Splay Trees. **Multiway Search Trees:** m-way Search Trees – B-Trees – B^+-Trees.

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 Travelling Salesperson problem – flow shop scheduling.
Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Bi connected 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: The Method – 0/1 Knapsack problem – Traveling Salesperson (*) – Efficiency Considerations.

Text Books:
1.   Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran Fundamentals of Computer Algorithms — University Press(India) Private Limited, Second Edition, Reprinted, 2017.

2. Adam Drozdek ,"Data Structures and Algorithms in C++", fourth edition Cengage Learning, August 2012

Reference Books:
1. Alfred V.Aho, John E.Hopcraft and Jeffrey D.Ullman -Data Structures and Algorithms, Pearson Education, Fourteenth Impression, 2013.
2. S.Sridhar -Design and Analysis of Algorithms –, Oxford University Press, 2015.
3. Michael T. Goodrich , Roberto Tamassia, David M. Mount ,"Data Structures and Algorithms in C++", 2nd Edition, Wiley, 2011.

Course Outcomes:

CO1: Apply the dynamic structures–trees, graph and discuss the application of these structures in finding simplified solutions   K1.
CO2: Understand the hashing,priority queues and its application   K2
CO3: Implement binary search tree, balanced tree and multi-way indexed tree   K3
CO4: Solve problems using dynamic programming and apply traversal techniques of trees and graphs   K3
CO5: Analyze and solve problems using backtracking and branch-and-bound technique   K4.

Mapping of COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO6	PSO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	S	M	S	S	S	S
CO2	S	S	M	S	S	S	M	M	S	S	S	S
CO3	S	M	M	M	M	M	S	M	S	M	S	S
CO4	M	S	M	S	S	S	M	M	S	S	S	S
CO5	S	M	S	S	S	M	S	M	M	S	S	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITT13	NETWORK AND INTERNET SECURITY	L	T	P	C
CORE –III			5	0	0	4
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze					
Course Objectives	• To study features of Network Security. • To understand the security concepts of algorithms and Encryption techniques. • To learn about the Firewalls and their concepts • To learn about the services and components. • To gain knowledge on modern methods of WAP.					

UNIT I: Security in Network:

Model for Security: Threats in Networks, Stealing Passwords, Social Engineering, Bugs and Backdoors, Authentication Failures, Protocol Failure, Information Leakage - Elementary Cryptography: Terminology and Background, Cryptography and network security. Concepts of Encryption and Decryption. Cryptanalysis, Substation Cipher. Transpositions Good and Secure Encryption Algorithm. Trust worthy Encryption systems Data encryption standards (DES) and Advanced Encryption Standards (AES) Comparison of DES and AES.

UNIT II: Classical Encryption Technique

Symmetric and Asymmetric Encryption Systems, Stream and Block Ciphers, Contemporary Symmetric Ciphers, Confidentiality using Symmetric Encryption - Public Key Encryption and HASH Functions: Public Key Cryptography and RSA, Message Authentication and Hash Function, Hash Algorithms, Digital Signatures and Authentication Protocols.

UNIT III: Firewalls

Basic Concepts (for understanding the firewalls rules): TCP Segment format IP Datagram format. Introduction: Kinds of Firewalls, Packet Filters. Packet Filtering. Dynamic Packet Filters. Application - Level Filtering. Circuit-Level Gateways, Firewall Configurations, Demilitarized Zone (DMZ) Networks, Distributed Firewalls, Limitation of Firewalls. Filtering Services: Reasonable Services to Filter (Filter Rules to be applied): DNS, Web, FTP, NTP. DNS (Domain Name Server): DNS overview, Protocol overview, Hierarchal Structure, Root Servers, Practical Experience. DNS Security: Unpatched Servers, Misconfigured Servers. DNS Cache Poisoning: Denial of Service Attack. Distributed Denial of Service Attack. Luring Users into a Crafted Site.

UNIT IV: Web Security

Overview of Web Server Security. Goal of Server Attack. Web site defacement. Data corruption. Data Theft. Types of Attacks. Web Server Protection. FTP (File Transfer Protocol) SMTP (Simple Mail Transfer Protocol). NTP (Network Time Protocol), Intrusion detection systems: Types of IDSs. Goal for Intrusion Detection systems, IDS Strength and Limitation. Electronic Mail Security: Security for E-mail. Designs, Example of Secure E- mail Systems, Pretty Good Privacy (PGP): How PGP works? S/MIME (Secure Multipurpose Mail Extension): MIME overview. S/MIME functionality.

UNIT V: Wireless Application Protocol Security (WAP)

Privacy Enhanced Mail (PEM) How PEM works? Secure Socket Layer (SSL): The Position of SSL in TCP/IP Protocol Suite. How SSL Works? The Handshake Protocol - The Record Protocol. The Alert Protocol - Wireless Application Protocol Security (WAP): The WAP Stack. The Security Layer-Wireless Transport Layer Security (WTLS). IP Security: Introduction and Overview: IPSec Protocols. The Internet Key Exchange (IKE) Protocol. Security Association (SA), Authentication Header (AH), Encapsulating Security Payload (ESP), IPSec Key Management.

Text Books:
1. William Stallings- "Cryptography and Network Security: Principles and practices", - Third Edition, Pearson, 2002.
2. Atul Kahate -"Cryptography and Network Security", , McGraw Hill Education India, 2013.
3. Bragg, Rhodes-Ousley -"The complete Reference Network Security", McGraw-Hill Professional, 2012.
4. Wenliang Du, Computer & Internet Security: A Hands-on Approach 2nd Edition, 2nd edition, 2019.
5. C.P.Pfleeger, and S. L. Pfleeger, "Security in Computing", Pearson Education, 2015.

Reference Books:
1. Matt Bishop, ìComputer Security: Art and Scienceî, Pearson Education, 2018.
2. J. Michael Stewart, "Network Security, Firewalls And VPNs", Jones & Bartlett Learning; 2nd Edition – 2013.

Course Outcomes

CO1: Learn about Network security services and mechanisms. K1

CO2: Understand Encryption technique and Firewalls. K2

CO3: Understand Data integrity, Authentication, Digital Signatures. K2

CO4: Various network security applications, IPSec, Firewall, IDS K3

CO5: Web security, Email security, WAP and Malicious software etc K4

Mapping of COs with POs and PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	M	S	M	S	S	S	S
CO2	S	S	M	S	S	S	M	M	S	S	S	S
CO3	S	M	M	M	M	S	M	M	S	M	S	M
CO4	M	S	M	S	S	S	M	M	S	S	S	S
CO5	S	M	S	S	S	M	S	M	M	M	S	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITT14	ADVANCED COMPUTER ARCHITECTURE	L	T	P	C
CORE –IV			5	0	0	4
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze					
Course Objectives	- To study the Advanced Computer Architecture - To understand the theories of Parallel Computing - To learn about the microprocessor and their properties - To learn about the Network Properties - To learn and develop cost effective computer applications.					

UNIT I: **Parallel computer models :**
The state of computing - Multiprocessors and multi-computers – Shared Memory Multi Computers: Uniform Memory Access - Non-uniform Memory Access (NUMA).
Multivector and SIMD computers: Vector Supercomputers – SIMD Supercomputers **–** PRAM and VLSI Models – Evolution of Parallel Computers.

UNIT II: Program and Network properties:
Data and resource dependencies - Conditions of parallelism – Program partitioning and scheduling – program flow mechanisms – system interconnect architectures.

UNIT III: Processors and memory hierarchy:
Advanced processor Technology – Super scalar and vector processors – Linear Pipeline Processors – Nonlinear pipeline Processors.

UNIT IV: Multiprocessors and Multi-computers:
Multiprocessor System interconnects – Message Passing Mechanisms – SIMD Computer Organizations – The Connection Machine CM 5 – Fine-Grain Multi-computers.

UNIT V: Software for Parallel Programming:
Parallel Programming Models – Parallel Languages and Compilers – Dependence Analysis of Data Arrays.

Text Books:
1. Kai Hwang, "Advanced Computer Architecture", McGraw-Hill International Edn., Singapore, 1993.
2. David A. Patterson, John L. Hennessy, David Goldberg, **"**Computer Architecture: A Quantitative Approach"**,** 2nd Edition Hardcover, 760 pages Published by Morgan Kaufman Publishers Publication date: January 1996

Reference Books:
1. Kai Hwang and Faye A.Briggs, "Computer Architecture and Parallel Processing", McGraw-Hill International Editions, Singapore, 1985.

2. Michael J.Quinn, "Parallel Computing, Theory and Practice", McGraw-Hill International Edn., Singapore , 1994.

Course Outcomes

At the end of the course, students will be able to

CO1: Recall the classes of computers, and new trends and developments in computer architecture K1.
CO2: Understand multithreading by using ILP and supporting thread-level parallelism (TLP) K2.
CO3: Understand pipelining, instruction set architectures, memory addressing K2
CO4: Understand symmetric shared-memory architectures and their performanceK2.
CO5: Analyze and Design the additional topics in computer architecture, such as multi-core processors, thread-level parallelism, and warehouse computing K3, K4.

MAPPING OF COs with POs and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	M	S	S	S	S
CO2	S	S	M	S	M	M	S	M	S	S	M	S
CO3	S	M	M	M	M	M	M	M	S	M	S	M
CO4	S	S	M	S	M	M	S	M	S	S	S	S
CO5	S	M	S	M	S	S	M	M	S	M	S	S

S – Strongly Correlating - 3 Marks   **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITP11	COMPUTING-LAB1 (ADVANCED JAVA PROGRAMMING AND DATA STRUCTURES & ALGORITHMS)	L	T	P	C
CORE –V			0	0	6	4
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					
Course Objectives:	• To Understand the Basic Programming Concepts of Java. • To know, how to import user defined package, to create thread program and string methods, Networking package classes and methods. • To learn about the Abstract Windowing Toolkit, Applet package classes, methods • To learn about the Basic Concepts of Remote Method Invocation, JDBC and Servlets • To learn the various hashing techniques, hashing, merging, n-queen pproblems using Backtracking. Implementation of Assignment Problem using Branch and bound., etc.,.					

Advanced Java Programming

1. Write a Program to display life cycle of an applet

2. Write a Program to display digital clock using applet

3. Write a Program to display different graphical shapes in applet

4. Write a Program to display graphical bar chart by passing parameters in applet

5. Write a Program to find factorial value of N using AWT high level event handling.

6. Write a Program to find sum of digits using RMI

7. Write a program in JAVA to implement a Client/Server application using RMI.

8. Write a Program using HTML/Java script to find length of the given string.

9. Write a Program to compute factorial value of N using Generic Servlet

10. Use JDBC connectivity and do the following:

   • Create Table

   • Insert records

   • Update the existing Data

Data Structure and Algorithm lab

1. Write a program for the Implementation of Stack Using 1)Array and 2)Linked List
2. Write a program for the Implementation of Queue Using 1)Array and 2)Linked List
3. Write a program for the Implementation of Heap Tree.
4. Write a program for the Implementation of Tree Traversal.
5. Write a program for the Implementation of BFS.
6. Write a program for the Implementation of DFS.
7. Write a program for the Implementation of Merge Sort using Divide and Conquer.
8. Write a program for the Implementation of Knapsack Problem using Dynamic Programming.
9. Write a program for the Implementation of Floyd's Algorithm using Dynamic Programming.
10. Write a program for the Implementation of Dijkstra's Algorithm using Greedy Technique.

Course Outcomes:

CO1: Recall the dynamic structures using Applets and find the simplified solutions K1
CO2: Understand the Program to to illustrate TCP based network communication. K2
CO3: Design the hashing priority queues & its application and to implement the binary search tree, balanced tree and multi-way indexed tree K3
CO4: Apply to Solve problems using dynamic programming and apply traversal techniques of trees and graphs K3
CO5: Analyze and solve problems using backtracking and branch-and-bound technique. K4

Mapping of COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO6	PSO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	S	M	S	S	S	S
CO2	S	S	M	S	S	S	M	M	S	S	S	S
CO3	S	M	M	M	M	M	S	M	S	M	S	S
CO4	M	S	M	S	S	S	M	M	S	S	S	S
CO5	S	M	S	S	S	M	S	M	M	S	S	S

S – Strongly Correlating - 3 Marks   **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

SEMESTER - II

COURSE CODE	P21ITT21	PYTHON PROGRAMMING	L	T	P	C
CORE –VI			5	0	0	4
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze					
Course Objectives	• To understand why Python is a useful scripting language for developers. • To learn how to design the Python applications. • To learn how to use lists, tuples, and dictionaries in Python programs. • To learn how to use recursive solution for the problems. • To learn how to identify Python object types.					

UNIT I : Python Programming: An Introduction
IDLE an Interpreter for Python, Python Strings, Relational Operators, Logical Operators, Bitwise Operators, Variables and Assignment Statements, Keywords, Script Mode. **Functions:** Built-in Functions, Function Definition and Call, Importing User-defined Module**,** Assert Statement, Command Line Arguments. **Control Structures -** if Conditional Statement, Iteration (for and while Statements).

UNIT II: **Scope**
Objects and Object IDs, Scope of Objects and Names. **Strings:** Strings, String Processing Examples, Pattern Matching. **Mutable and Immutable Objects –** Lists, Sets, Tuples, Dictionary.

UNIT III : **Recursion**
Recursive Solutions for Problems on Numeric Data, Recursive Solutions for Problems on Strings, Recursive Solutions for Problems on Lists, Problem of Tower of Hanoi.
Files and Exceptions: File Handling, Writing Structures to a File, Errors and Exceptions, Handling Exceptions Using try…except, File Processing Example.

UNIT IV: **Classes I**
Classes and Objects, Person: An Example of Class, Class as Abstract Data Type, Date Class. **Classes II -** Polymorphism, Encapsulation, Data Hiding, and Data Abstraction, Modifier and Accessor Methods, Static Method, Adding Methods Dynamically, Composition, Inheritance, Built-in Functions for Classes.

UNIT V: **Graphics**
2D Graphics, Animation – Bouncing Ball. **Applications of Python-** Collecting Information from Twitter, Sharing Data Using Sockets, Managing Databases using Structured Query Language (SQL), Developing Mobile Application for Android, Integrating Java with Python.

Text Books:
1.   Sheetal Taneja, Naveen Kumar Python Programming a Modular Approach with Graphics, Database, Mobile, and Web Applications—Pearson Publication, 2018.

Reference Books:
1.   Reema Thareja - Python Programming –,Oxford University Press, 2017
2.   Lambert -Fundamentals of Python Programming,– Cengage Publications, 2017
3.   E. Balagurusamy - Problem Solving using Python, Mc Graw Hill Education Ltd., 2017.
4.   Dieter Uckelmann; Mark Harrison; Florian Michahelles - Architecting the Internet of Things, (Eds.) Springer, 2011.
5.   Oliver Hersent, David Boswarthick, Omar Elloumi, Wiley - The Internet of Things, Key Applications and Protocols, , 2017

Course Outcomes
CO1: Describe the basic concepts of python programming, Functions and control structures K1

CO2: Understand Strings, Mutable and immutable objects K2

CO3: Understand Recursion and Files and exception K3

   CO4: Discuss classes, objects, polymorphism, encapsulation and inheritance K3

   CO5: Apply python for collecting information from twitter, sharing data using sockets, managing database, and mobile application for android K4

Mapping of COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	S	M	M	S	S	S	S
CO2	S	S	M	S	M	S	M	M	S	S	S	S
CO3	S	M	M	M	M	S	S	M	S	M	S	M
CO4	M	S	M	S	M	M	M	M	S	S	S	S
CO5	S	M	S	S	M	S	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITT22	ARTIFICIAL INTELLIGENCE	L	T	P	C
CORE –VII			5	0	0	4
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze		
Course Objectives	- To have an idea for the engineering issues underlying the design of AI systems. - To have a basic proficiency in a traditional AI language including an ability to write simple intermediate programs and an ability to understand the code written in that language. - To have an understanding of the basic issues of knowledge representation and blind by heuristic search - To have an understanding of topics such as minimax, resolution, etc. that play an important role in AI programs. - To have a basic understanding of some of the advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.					

UNIT I: Introduction:
Introduction - Intelligent Agents- Problem Solving - by Searching - Informed Search and Exploration - Constraint Satisfaction Problems - Adversarial Search

UNIT II: Reasoning:
Knowledge and Reasoning - Logical Agents - First-Order Logic - Inference in First-Order Logic - Knowledge Representation

UNIT III: Planning:
Planning – Planning and Acting in the Real World - Uncertain knowledge and reasoning - Uncertainty - Probabilistic Reasoning - Probabilistic Reasoning Over Time - Making Simple Decisions - Making Complex Decisions

UNIT IV: Learning:
Learning - Learning from Observations - Knowledge in Learning - Statistical Learning Methods - Reinforcement Learning

UNIT V: Communication:
 Communicating, Perceiving, and Acting -   Communication – Probabilistic
 Language Processing – Perception – Robotics

Text Books

1.   David L. Poole and Alan K. Mackworth, -Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010

2. . Bratko, - Prolog: Programming for Artificial Intelligence, Fourth Edition, Addison-Wesley Educational Publishers Inc., 2011**.**

Reference Books:
1. Nils J. Nilsson, Principles of Artificial Intelligence, Narosa Publication, 1980.
2. Patrick H.Winston, Artificial Intelligence, 3rd Edition, Pearson Education, 1992.

COURSE OUTCOMES
CO1: To expose the students the fundamental concepts of Artificial Intelligence and its applications**.** K1
CO2: Understanding about the basic concepts of Software agents and representation of knowledge K2
CO3: Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models. K2
CO4: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning. K3
CO5: Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations. K4

MAPPING OF COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	M	S	S	S	S
CO2	S	S	M	S	S	M	S	M	S	S	S	S
CO3	S	M	M	M	M	M	S	M	S	M	S	S
CO4	M	S	M	S	S	M	S	M	S	S	S	S
CO5	S	M	S	S	M	S	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITT23	DATA MINING AND WARE HOUSING	L	T	P	C
CORE -VIII			4	0	0	4
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze					
Course Objectives	- To make the students to understand the data mining principles and techniques - To discover the knowledge in the high dimensional system. - To study algorithms for finding the hidden interesting patterns in data. - To expose the students on the concepts of Data warehousing Architecture. - To Implementation and to study the overview of developing areas like Web mining, Text mining, Big Data Mining Tools of Data mining..					

UNIT– I: Introduction to Data Warehousing:

Evolution of Decision Support Systems-Data Warehousing Components–Building a Data Warehouse, Data Warehouse and DBMS, Data Marts, Metadata, Multidimensional Data Model, OLAP vs. OLTP, OLAP Operations, Data Cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations.

UNIT–II: Data Warehouse Process and Architecture:

Types of OLAP Servers,3–Tier Data Warehouse Architecture, Distributed and Virtual Data Warehouses. Data Warehouse Implementation, Tuning and Testing of Data Warehouse. Data Staging (ETL) Design and Development, Data Warehouse Visualization, Data Warehouse Deployment, Maintenance, Growth, Business Intelligence Overview - Data Warehousing and Business Intelligence Trends- Business Applications – Tools – SAS.

UNIT–III: Introduction to Data Mining:

Data Mining - KDD versus Data Mining, Stages of the Data Mining Process- Task Primitives, Data Mining Techniques - Data Mining Knowledge Representation – Data Mining Query Languages, Integration of a Data Mining System with a Data Warehouse – Issues, Data preprocessing – Data Cleaning, Data Transformation, Feature Selection, Dimensionality Reduction, Discretization and Generating Concept Hierarchies-Mining Frequent Patterns Association-Correlation.

UNIT–IV: Classification and Clustering

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods - Clustering techniques – Partitioning Methods - k-means - Hierarchical Methods-Distance - based Agglomerative and Divisible Clustering, Density - Based Methods – Expectation Maximization - Grid Based Methods – Model - Based Clustering Methods – Constraint –Based Cluster Analysis – Outlier Analysis.

UNIT– V   Trends of Datamining and Big Data Mining:

Introduction to Big Data-Case Studies on Big Data Mining Tools: Apache Hadoop, Apache Mahout and R-Mining Complex Data Objects, Spatial Databases, Temporal Databases, Multimedia Databases, Time Series and Sequence Data; Text Mining – Web Mining-Application and Trends in Data Mining.

Text Book(s):
1. Jiawei Han and Micheline Kamber,―Data Mining: Concepts and Techniques ‖,Morgan Kaufmann Publishers, Third Edition, 2011.
2. Paul Zikopoulos, Chris Eaton, Dirk De Roos, Tom Deutsch, George Lapis, ―Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming‖, McGraw-Hill Osborne Media, First Edition, 2011.

Reference Book(s):
1. Pang-Ning Tan ,Michael Steinbach, Anuj Karpatne, Vipin Kumar," Introduction to Data Mining" , Pearson; 2nd edition – 2018.
2. Parteek Bhatia, "Data Mining and Data Warehousing: Principles and Practical Techniques", Cambridge University Press - 2019
3. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, An Introduction to Statistical Learning: with Applications in R‖, Springer, 2014.

COURSE OUTCOMES

CO1: Recall the introductory concepts, issues and Types of attributes of Data Mining K1.
CO2: Apply the methods of Preprocessing, Data cleaning and implementation of Data Warehouse K2.
CO3: Understand the methods of Mining Frequent Patterns, Associations and Correlations K2,
CO4: Design and evaluate Classification algorithms K4
CO5: Analyze and Design the Cluster Analysis and categorize the Cluster Methods K3, K4..

MAPPING OF COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	M	S	S	S	S
CO2	S	S	M	S	M	M	S	M	S	S	S	S
CO3	S	M	M	M	S	S	M	M	S	S	S	M
CO4	M	S	S	S	S	S	S	M	S	S	S	S
CO5	S	M	S	S	M	M	S	M	M	M	M	S

S – Strongly Correlating - 3 Marks   **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITT24	DISTRIBUTED COMPUTING	L	T	P	C
CORE -IX			4	0	0	4
Cognitive Level	**K1:** Recall	**K2:** Understand	**K3:** Apply	**K4:** Analyze		
Course Objectives	• To provide hardware and software issues in modern distributed systems. • To get knowledge in distributed architecture. • To get knowledge in distributed computing synchronization, consistency, replication, fault tolerance, security, and distributed file systems. • To analyze the current popular distributed systems • To analyze peer-to-peer systems as prerequisites.					

UNIT I: Introduction to Distributed System:
Goals, Hardware concepts, Software concepts, and Client - Server model. Examples of distributed systems.
Communication: Layered protocols, Remote procedures call, Remote object invocation, Message – oriented communication, Stream-oriented communication.

UNIT II: Processes:
Threads, Clients, Servers, Code Migration, Software agent.
Naming: Naming entities, locating mobile entities, removing un-referenced entities.

UNIT III: Synchronization:
Clock synchronization, Logical clocks, Global state, Election algorithms, Mutual exclusion, Distributed transactions.
Consistency and Duplication: Introduction, Data centric consistency models, Client centric consistency models, Distribution protocols, Consistency protocols.

UNIT IV: Fault Tolerance:
Introduction, Process resilience, Reliable client server communication, Reliable group communication. Distributed commit, Recovery.
Security: Introduction, Secure channels, Access control, Security management.

UNIT V: Distributed File System:
Sun network file system, CODA files system. **Case Study:** CORBA, Distributed COM, Globe, Comparison of CORBA, DCOM, and Globe.

Text Book(S):

1. A.D.Kshemkalyani, M.Singhal, Distributed Computing: Principles, Algorithms, and Systems, ISBN: 9780521189842, Cambridge University Press, March 2011.
2. S.Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second Edition, Prentice Hall, 2006.

Reference Book(s):
1. G.Coulouris, J.Dollimore, and T.Kindberg - Distributed Systems: Concepts and Design, 5th Edition, Addison-Wesley, 2012.

COURSE OUTCOMES
CO1: Describe the introductory concepts of Distributed Systems, Types of Communication K1
CO2: Explain the Types of Processes and entities K2
CO3: Discuss Synchronization and Consultancy of Distributed Systems K3
CO4: Describe Fault Tolerance and Security Issues of Distributed Systems K3
CO5: Summarize Distributed File System and Case Study K4

MAPPING OF COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	S	S	S	M	S	S	S	S
CO2	S	S	M	S	S	S	S	M	M	S	S	S
CO3	S	M	M	M	M	M	M	S	S	M	S	M
CO4	M	S	S	S	S	S	S	M	S	S	S	S
CO5	S	M	S	S	M	M	S	M	M	M	M	S

S – Strongly Correlating - 3 Marks   **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITP22	COMPUTING-LAB 2 (PYTHON AND DATA MINING)	L	T	P	C
CORE -X			0	0	6	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze				
Course Objectives		• To prepare Python program with the useful scripting language for developers. • To design the Python applications for lists, tuples, dictionaries and object types • Solve a program to find the hidden interesting patterns in data. • To expose the students on the concepts of Data warehousing Architecture • To Implementation and write a program to develop an areas like Web mining, Text mining, Classification, SVM of Data mining.				

PYTHON LIST

1. Write a program for Running instructions in Interactive interpreter and a Python Script
2. Write a program that takes 2 numbers as command line arguments and prints the sum.
3. Write a program using a while loop that asks the user for a number, and prints a count down from that number to zero.
4. Write a program to count the numbers of characters in the string and store them in a dictionary data structure
5. Write a program to compute the number of characters, words and lines in a text file.
6. Find Mean, Median, Mode for the given set of numbers in a list.
7. Write function to compute GCD, LCM of two numbers. Each function should not exceed one line.
8. Write a program to perform
     1. Addition of Two Matrices
     2. Multiplication of Two matrices
9. Write a simple script that serves a simple HTTP Response and a simple HTML Page
10. Write a test-case to check the function reverse string which returns the reversed string
11. Build any one classical data structure.

DATA MINING LIST

1. Write a program to get the input from user and perform numerical operations (MAX, MIN, AVG, SUM, SQRT, ROUND).
2. Write a program to perform data import/export(.CSV, .XLS, .TXT)operations using data frames.
3. Write a program to get the input matrix from user and perform Matrix addition, subtraction, multiplication, inverse transpose and division operations using vector concept.
4. Write a program to perform statistical operations (Mean, Median, Mode and Standard deviation).
5. Write a program to perform data pre-processing operations Handling Missing data Min-Max Normalization

6. Write a program to perform dimensionality reduction operation using PCA.
7. Write a program to perform Simple Linear Regression and Multi Linear Regression.
8. Write a program to perform K-Means clustering operation and visualize it.
9. Write a program to diagnose any disease using KNN classification.
10. Write a program to perform market basket analysis using Apriori algorithm.
11. Write a program to perform any of the Decision Tree .
12. Write a program to perform Support Vector Machines.
13. Write a program to perform any of the Applications of classification for web mining.
14. Perform a Case Study on Text Mining or any commercial application.

Course Outcomes

CO1: Apply the basic concepts of python programming, Functions and control structures K1

CO2: Understand Strings, Mutable and immutable objects K2.

CO3: Understand Recursion and Files and exception K2

CO4: Analyze the concepts of classes, objects, polymorphism, encapsulation and inheritance K4

CO5: Analyze and Design the concepts of simple linear regression, KNN, SVM, classification and Text Mining K3, K4

Mapping of COS with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	S	M	M	S	S	S	S
CO2	S	S	M	S	M	S	M	M	S	S	S	S
CO3	S	M	M	M	M	S	S	M	S	M	S	M
CO4	M	S	M	S	M	M	M	M	S	S	S	S
CO5	S	M	S	S	M	S	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks   **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITS22	WEB PROGRAMMING	L	T	P	C
SUPPORTIVE COURSE II			-	-	2	2
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze				
Course Objectives		• To demonstrate a XHTML file that includes Java script language for developers. • To learn to write Perl program to accept UNIX command from a HTML form and to display the output of the command executed • To develop PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page. • To develop XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting • Write a program to store the values in MySQL table. Retrieve and display the data based on Name.				

1.. Develop and demonstrate a XHTML file that includes Java script for the following

   problems:

   a) Input: A number n obtained using prompt Output: The first n Fibonacci numbers
   b) Input: A number n obtained using prompt Output: A table of numbers from 1 to n and their squares using alert

2. a) Develop and demonstrate, using Java script , a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.
   b) Modify the above program to get the current semester also (restricted to be a number from 1 to 8)

3. a) Develop and demonstrate, using Java script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.
   b) Modify the above document so that when a paragraph is moved from the top stacking position, it returns to its original position rather than to the bottom.

4. a) Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, Name of the College, Brach, 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 a 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.
8. Write a Perl program to insert name and age information entered by the user into a table created using
   MySQL and to display the current contents of this table.
9. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.
10. Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.
11. Create a XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on Name.
12. Build a Rails application to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.

Course Outcomes

 CO1: Design and Recall the basic concepts of java script language K1, K4

 CO2: Understand and design the basic concepts of Perl structure, XHTML K2., K4

 CO3: Apply the date and time procedure in PHP K2

 CO4: Understand the concepts to vies the counts in session K2

 CO5: Analyze and Design the database connectivity using MySQL, K3, K4

 Mapping of COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	S	M	M	S	S	S	S
CO2	S	S	M	S	M	S	M	M	S	S	S	S
CO3	S	M	M	M	M	S	S	M	S	M	S	M
CO4	M	S	M	S	M	M	M	M	S	S	S	S
CO5	S	M	S	S	M	S	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

SEMESTER –III

COURSE CODE	P21ITT31	DIGITAL IMAGE PROCESSING	L	T	P	C
CORE – XI			4	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyse
Objectives	- To learn about the basic concepts of digital image processing and various image transforms. - To familiarize the students with the image enhancement techniques - To expose the students with a broad range of image processing techniques and their applications. - To adopt the use of current technologies those are specific in image processing systems - To ask the students to expose an image processing techniques in the real – world applications of image processing.

UNIT I: Introduction to Image Processing:

Overview of Image Processing - Nature of Image Processing - Digital Image Representation-Types of Images-Based on Nature - Based on Attributes - Based on Colour - Based on Dimensions – Based on Data Types – Domain Specific Images – Digital Image Processing Operations - Fundamental Steps In Image Processing - Image Enhancement -Image Restoration - Image Compression - Image Analysis – Image Synthesis.

Digital Imaging Systems:

Overview of Digital Imaging Systems-Image Sensors-Image Storage-Image processors-Output Devices-Networking Components-Image Processing Software-Physical Aspects of Image Acquisition-Nature of Light-Simple Image Model - Colour Fundamentals -Lighting System Design-Simple Image Formation Process - Biological Aspects of Image Acquisition-Human Visual System – Properties of Human Visual System –Monochrome and Colour Image - Review of Digital Cameras - Sampling and Quantization – Sampling - Resampling - Image Quantization - Image Display Devices and Device Resolution – Digital Halftone Process - Random Dithering - Ordered Dithering - Non - periodic Dithering – Image Storage and File Formats - Need for File Formats - Types of File Formats - Structures of File Formats.

UNIT II: Digital Image Processing Operations:

Basic Relationships and Distance Metrics - Image Coordinate System - Image Topology - Connectivity-Relations-Distance Measures-Important Image Characteristics-Classification of Image Processing Operations - Arithmetic Operations. Logical Operations – Geometrical Operations - Image Interpolation Techniques - Set Operations. Digital Image Transforms : Need for Image Transforms-Spatial Frequencies in Image Processing- Introduction to Fourier Transform-Discrete Fourier Transform- Fast Fourier Transform-Discrete Cosine Transform.

UNIT III: Image Enhancement:

Image Quality and Need for Image Enhancement - Image Quality Factors - Image Quality

Assessment Toll- Image Quality Metrics-Image Enhancement operations-Image Enhancement in Spatial Domain-Linear Point Transformations-Non-Linear Transformations–Square Function-Square root-Logarithmic Function–Exponential Function - Power Function - Gamma Correction - Histogram - Based techniques – Histogram Stretching – Histogram Sliding – Histogram Equalization – Histogram Specification – Local and Adaptive Contrast Enhancement – Spatial Filtering Concepts – Image Smoothing Spatial Filters- Box Filters - Gaussian Filters - Image Sharpening Spatial Filters - Gradient and Laplacian Filters-High-boost Filters - Unsharp Masking.

Image Restoration: Introduction to Degradation - Types of Image Degradations - Image Degradation Model - Noise Modelling -Noise Categories Based on Distribution - Noise Categories Based on Correlation – Noise Categories BasedonNature-NoiseCategoriesBasedonSource-EstimationbyObservationEstimation by Experimentation - Estimation by Modelling - Image Restoration Techniques –Unconstrained Method-Inverse Filters-Wiener Filters.

UNIT IV: Image Compression:

Image Compression Model-Compression-Measures-Compression Algorithm and its Types – Entropy Coding - Predictive Coding - Transform Coding - Layered Coding - Types of Redundancy - Coding Redundancy - Inter pixel Redundancy – Psycho visual Redundancy - Chromatic Redundancy - Lossless Compression Algorithms - Run - length Coding – Huffman Coding - Bit plane Coding - Arithmetic Coding - Dictionary - based Coding – Lossless Predictive Coding - Lossy Predictive Coding - Vector Quantization –Codebook design – Generalized Lloyd algorithm.

UNIT V: Image Segmentation:

Introduction-Formal Definition of Image Segmentation-Classification of Image Segmentation Algorithms - Detection of Discontinuities –Point Detection-Line Detection - Edge Detection – Stages in Edge Detection-Types of Edge detectors –First order Edge Detection-Edge operator performance - Edge linking Algorithms - Principle of Thresholding - Principle of Region – growing. Colour Image Processing - Introduction - Colour Image Storage and Processing -Colour Models - RGB Colour Model - HIS Colour Model - HSV Colour Model - HLS Colour Model - Printing Colour Models - Colour Quantization - Popularity Algorithm – Median cut Algorithm-Octree based Algorithm-Pseudo colour Image Processing-Full colour Processing- Colour Transformations –Image Filters for Colour Image- Colour image segmentation.

Text Books:
1. S.Sridhar -DIGITAL IMAGE PROCESSING, Second Edition, OXFPRD University Press, 2016.
2. Rafael C. Gonzalez, Digital Image Processing, Pearson India; 4th edition – 2018.

Reference Books:

1. R. C. Gonzalez and R. E. Woods ," Digital Image Processing Using MATLAB , Gatesmark - 2020
2. A.Jain - Fundamentals of Digital Image Processing, ,Prentice Hall of India, 2010.
3. Chris Solomon and Toby Breckon ,"Fundamentals of Digital Image Processing: A Practical Approach with Examples in Matlab" , Wiley; 1st edition - 2011

COURSE OUTCOMES

CO1: To impart the knowledge about image processing techniques and understand the concept of image analysis, storage formats of image **K1**

CO2: To analyze the attitude of image processing arithmetic operations and image transformation techniques. **K2**

CO3: Discuss about the image need for image enhancement and use of image restoration. **K3**

CO4: To understand the concept to fit image compression models, measures and algorithms. **K3**

CO5: Understand the role of image segmentation, various color models and color image transformation **K4**

MAPPING OF COs WITH POs AND PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	M	S	S	S	S
CO2	S	S	M	S	S	S	M	M	S	S	S	S
CO3	S	M	M	M	M	S	M	S	S	M	S	M
CO4	M	S	S	S	S	M	S	M	S	S	S	S
CO5	S	M	S	S	M	S	S	M	M	M	M	S

S – Strongly Correlating - 3 Marks   **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITT32	CLIENT SERVER COMPUTING	L	T	P	C
CORE - XII			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyse				
Course Objectives		• To learn about **normalization in** Client/Server Computing. • To learn about Client/Server Computing evaluations in details. • To develop tools used in operating system, • To know about database management system and its mechanism with respect of Client/Server computing • To Study about network components used in order to build effective Client/Server applications.				

UNIT I: Introduction:
 Introduction-Classification of Client/Server System: Two-tier Client/Server Model-Three-tier Client/Server Model-Client/Server Advantages and Disadvantages. Driving Forces behind Client/Server Computing: Driving Forces-Development of Client/Server Systems- Client/Server Standards- Client/Server Security-Improving Performance of Client/Server Applications-Downsizing and Rightsizing-Client/Server Methodology.

UNIT II: Architecture of Client/Server Systems:
 Components-Principles behind Client/Server Systems- Client Components-Server Components-Communications Middleware Components-Architecture for Business Information System-Existing Client/Server Architecture.
Client/Server and Databases: Client/Server in Respect of Databases-Client/Server Database Architecture-Database Middleware Component-Access to Databases-Distributed Client/Server Database Systems-Distributed DBMS

UNIT III: Client/Server Application Components: Technologies for Client/Server Application-Service of a Client/Server Application-Categories of Client/Server Applications-Client Services-Server Services-Client/Server Application: Connectivity-Client/Server Application: Layered Architecture.

UNIT IV: System Development:
 Hardware Requirements-Software Requirements-Communication Interface Technology: Network Interface Card, LAN Cabling, WAN, ATM, Ethernet, Token Ring, FDDI, TCP/IP,SNMP,NFS,SMTP

UNIT V: Client/Server Technology and Web Services:
Web Services History-Web Server Technology-Web Server-Web Server Communication-Role of JAVA for Client/Server on Web-Server Technology-Client/Server Technology and Web Applications-Server's Changing Role.
Future of Client/Server Computing: Technology of Next Generation-Enabling Technology-

Client/Server Computing and the Intranet - Transformational System.

Text Books:
1.   Subash Chandra Yadav, Sanjay Kumar Singh, "An Introduction to Client/ Server Computing", New Age International Publishers - 009. Dawana Travis Dewire, "Client/Server Computing", Tata McGraw - Hill Publishing Company Limited, New Delhi, 2003.
2.   Patrick Smith and Steve Guengesich, "Client/Server Computing", Prentice Hall of India, New Delhi, 2002.

Reference Books:
1.   Robert Orfali, Dan Harkey and Jeri Edwards, "Essential Client/Server Survival Guide", Galgotia Publications, New Delhi, 2001.
2.   Joel P Kaster, "Understanding Thin Client/Server Computing", Prentice Hall of India, New Delhi, 2001.

COURSE OUTCOMES
CO1: Comprehend the basic concepts of the client-server model. K1
CO2: Understand how Client-Server systems work K2
CO3: Differentiate between two-tier and three-tier architectures K3
CO4: Improve the performance and reliability of Client Server based systems K3
 CO5: Identify security and ethical issues in Client Server Computing K4

MAPPING OF COs WITH POs AND PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	S	M	S	S	S	S
CO2	S	S	M	S	S	M	S	M	S	S	S	S
CO3	S	M	M	M	M	S	M	S	S	M	S	M
CO4	S	S	S	S	M	M	S	M	M	S	S	S
CO5	S	M	S	S	M	S	M	M	M	M	M	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITT33	**BIG DATA ANALYTICS**	L	T	P	C
CORE - XIII			4	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze				
Course Objectives		• The course provides grounding in basic and advanced methods in big data technology and tools. • It includes Map Reduce process, Hadoop and its ecosystem. • Conceptualization and summarization of big data and machine learning. • Trivial data versus big data, big data computing technologies, machine learning techniques, • It includes scaling up of machine learning approaches.				

UNIT I: Introduction to Big Data:
Types of Digital Data: Classification of Digital Data, Introduction to Big Data: Characteristics of data - Evolution of Big data - Challenges of Big data - Other Characteristics of Data Which are not Definitional Traits of Big Data - Why Big Data? – Are we Just an Information Consumer or Do we also produce Information? - Traditional Business Intelligence (BI) versus Big Data – A Typical Data Warehouse Environment – A Typical Hadoop Environment – What is New Today? – What is changing in the Realms of Big Data?

UNIT II: Analytics Basics:
Big Data Analytics: Where do we Begin? – What is Big Data Analytics? –What Big Data Analytics Isn't? – Why this Sudden Hype Around Big Data Analytics? Classification of Analytics – Greatest Challenges that Prevent Business from capitalizing on Big Data – Top Challenges Facing Big Data – why is Big Data Analytics Important? – What kind of Technologies are we looking Toward to Help Meet the Challenges Posed by Big Data? – DataScience–DataScientist…YourNewBestFriend–TerminologiesUsedinBigDataEnvironments – Basically available Soft State Eventual Consistency (BASE) – Few Top Analytics Tools.

UNIT III: Big Data Technologies:
The Big Data Technology Landscape: NoSQL (Not Only SQL) - Hadoop, Introduction to Hadoop: Introducing Hadoop – Why Hadoop? – Why not RDBMS? – RDBMS versus Hadoop – Distributed Computing Challenges – History of Hadoop – Hadoop Overview – Use Case of Hadoop – Hadoop Distributors – HDFS (Hadoop Distributed File System) Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator) – Interacting with Hadoop Ecosystem.

UNIT IV: Introduction to MAP REDUCE Programming:
 Introduction – Mapper – Reducer –Combiner – Partitioner – Searching – Sorting – Compression, Introduction to Hive: What is Hive? – Hive Architecture – Hive Data Types – Hive File Format – Hive Query Language (HQL) –RC File Implementation – User – Defined Function (UDF).

UNITV: Analytical Algorithms:

 Introduction to Machine Learning – Machine Learning Steps - Classification of Machine Learning Algorithms: Supervised Learning and Unsupervised Learning – Reinforcement Learning – Semi-Supervised Learning.

Text Book:
1. Seeme Acharya, and Subhashini Chellappan Big Data and Analytics, , Wiley India Pvt. Ltd. First Edition - 2015.

Reference Books:
1. Nathan Marz, and James Warren - BigData – Principles and best practices of scalable real – time data systems, , Manning Publication CP., USA-2015.
2. Analytics in a Big Data World: The Essential Guide to Data Science and its Applications, Bart Baesens, Wiley India Pvt. Ltd - 2015.
3. Jared Deamn Big Data, Data Mining and Machine Learning, Willey India Pvt. Ltd, 2015.

COURSE OUTCOMES

CO1: Describe the basics of BigData, Types of Data and Data Warehouse Environment K1
CO2: Understand the Data Analytics, Evolution, Importance, Tools, Technology and Data Science. K3
CO3: Analyze the technologies and comparison of No SQL, RDMS, Hadoop, and YARN K2
CO4: Analyze the working methodology of Map Reduce and Hive Query Language K4
CO5: Implement the machine learning Algorithms K4

MAPPING OF COs WITH POs AND PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	M	M	S	M	S	S	S	S
CO2	S	S	M	S	S	S	S	M	M	S	S	S
CO3	S	M	M	M	M	S	M	S	S	M	S	M
CO4	M	S	S	S	S	M	S	M	S	S	S	S
CO5	S	M	S	S	S	S	M	M	M	M	M	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITT34	INTERNET OF THINGS	L	T	P	C
CORE - XIV			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyse				
Course Objectives		• To get familiar with the evolution of IOT with its design principles • To outline the functionalities and protocols of internet communication • To analyze the hardware and software components needed to construct IOT applications • To identify the appropriate protocol for API construction and writing embedded code to realize • To identify various business models and ethics in Internet of Things				

UNIT I: Introduction to Internet of Things:
Introduction – Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT & Deployment Templates.
Domain Specific IoTs: Introduction – Home Automation – Cities – Environment – Energy – Retail – Logistics Agriculture – Industry – Health & Life style.

UNIT II: IoT and M2M:
Introduction: M2M – Difference between IoT and M2M – SDN and NFV for IoT. **IoT System Management with NETCONF-YANG:** Need for IoT Systems Management – Simple Network Management Protocol (SNMP) – Network Operator Requirements – NETCONF-YANG – IoT Systems Management with NETCONF_YANG.

UNIT III: IoT Platforms Design Methodology:
Introduction – IoT Design Methodology – Case Study on IoT System for Weather Monitoring – Motivation for using Python.
IoT Systems –Logical Design using Python: Introduction – Installing Python – Python Data types & Data Structures – Control Flow – Functions – Modules – Packages – File Handling – Date/Time Operations – Classes – Python packages of Interest for IoT.

UNIT IV: IoT Physical Devices & Endpoints:
 What is an IoT Device – Exemplary Device: Raspberry Pi – About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python – Other IoT devices.
 IoT Physical Servers & Cloud Offerings : Introduction to Cloud Storage Models & Communication APIs – WAMP - AutoBahn for IoT– Xively Cloud for IoT – Python Web application Framework-Django – Designing a RESTful API – Amazon Web Services for IoT – Skynet IoT messaging platform.

UNIT V: Case Studies Illustrating IoT Design:
Introduction – Home Automation – Cities – Environment – Agriculture – Productivity applications.
Data Analytics for IoT: Introduction – Apache Hadoop – Using Hadoop MapReduce for Batch Data Analysis – Apache Oozier – Apache Spark – Apache Storm – Using Apache Storm for Real-time Data Analysis.

Text Books:

1. Arshdeep Bahga, Vijay Madisetti Internet of Things, , Universities Press (INDIA)Private Ltd., 2015.
2. Honbo Zhou The Internet of Things in the Cloud: A Middleware Perspective, CRC Press, 2012.
3. Dieter Uckelmann; Mark Harrison; Florian Michahelles Architecting the Internet of Things, (Eds.) Springer, 2011.

Reference Books:

1. CunoPfister, O'Relly Getting Started with the Internet of Things, 2011.
2. Adrian Mcewen, Hakin Cassimally, Willey Designing the Internet of Things, 2015.
3. Oliver Hersent, David Boswarthick, Omar Elloumi, Wiley The Internet of Things, Key Applications and Protocols, 2017

COURSE OUTCOMES

CO1: Understand the definition and significance of the **Internet of Things**. K1

CO2: Discuss the architecture, operation, and business benefits of an **IoT** solution. K2

CO3: Examine the potential business opportunities that **IoT** can uncover. K3

CO4: Explore the relationship between **IoT**, cloud computing, and big data. K3

CO5: Identify how IoT differs from traditional data collection systems K4

MAPPING OF COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	S	M	S	M	S	S	S	S
CO2	S	S	M	S	S	M	M	M	M	S	S	S
CO3	S	M	M	M	S	S	S	S	S	M	S	M
CO4	M	S	S	S	M	S	M	M	S	S	S	S
CO5	S	M	S	S	M	S	S	M	M	M	M	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITP33	COMPUTING-LAB 3 (DIGITAL IMAGE PROCESSING)	L	T	P	C
CORE – XV			0	0	6	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				
Course Objectives		• To implement spatial image enhancement functions on a bitmap image – mirroring (Inversion) using MATLAB for developers. • To analysis design the operators using filtering techniques. • Write a program to perform the histogram equalization and to Program blurring and de-blurring on an image. • To develop to importrt an image function for Image Restoration, Models for representing the color and methods of processing the color plane.				

List of programs

1. Implement the spatial image enhancement functions on a bitmap image – mirroring(Inversion)
2. Implement the spatial image enhancement functions on a bitmap image – notation(Clockwise)
3. Implement the spatial image enhancement functions on a bitmap image –Enlargement (Double Size)
4. Implement (a) Low Pass Filter(b)High Pass Filter
5. Implement (a) Arithmetic Mean Filter (b) Geometric Mean Filter
6. Implement Smoothing and Sharpening of an eight bit color image
7. Implement (a) Boundary Extraction Algorithm (b) Graham ' Scan Algorithm
8. Implement (a) Edge Detection (b) Line Detection
9. Display an image and its histogram
10. Write a Program to Perform Shrinking, Zooming and Cropping of an image
11. Write a Program to perform the experiment for histogram equalization.
12. Write a Program to Perform blurring and de-blurring on an image.
13. Write a Program to Remove salt and pepper noise in an image.
14. Write a Program to Perform Edge detection using Operators.
15. Write a Program to Perform2-D DFT and DCT.

16.   Write a Program to Perform DWT of images.

17.   Implement a function for image segmentation.

18.   Implement a function for image morphology that analyze the form and shape detail of image structures.

19.   Implement a function for Image Restoration.

20.   Models for representing the color and methods of processing the color plane

COURSE OUTCOMES

CO1:   Understand the knowledge about image processing techniques and the concepts of image analysis, storage formats of image **K1**

CO2:   To analyze the attitude of image processing arithmetic operations and image transformation techniques. K**4**

CO3:   Apply the image enhancement techniques to use the image restoration process. **K3**

CO4:   Understand the concept to fit image compression models, measures and algorithms. **K2**

CO5:   Analyze and design the image segmentation, various color models and color image transformation **K4**

MAPPING OF COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	M	S	S	S	S
CO2	S	S	M	S	S	S	M	M	S	S	S	S
CO3	S	M	M	M	M	S	M	S	S	M	S	M
CO4	M	S	S	S	S	M	S	M	S	S	S	S
CO5	S	M	S	S	M	S	S	M	M	M	M	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITP34	COMPUTING-LAB 4 (PHP WITH MYSQL)	L	T	P	C
CORE – XVI			0	0	6	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				
Course objectives		- To develop PHP program using general concepts for general programs, conditional and unconditional statements - To develop PHP program using switch cases, sorting - To Design a personal Information form, then Submit & Retrieve the Form Data Using Variables - To study of MySQL string, numeric and date functions, - To develop PHP Data Base Connectivity with MYSQL				

List of Exercises

1. Write a PHP program to find the factorial of a number using forms.

2. Write a PHP program to design a login form using Conditional Statements.
3. Write a PHP program to design a visiting card.
4. Develop a PHP program for string function using switch case.
5. Write a PHP Program to create a time table for the current semester.
6. Write a program In PHP to Sort an array using function (Bubble Sort)
7. Study Of Form handling In PHP Design a personal Information form , then Submit & Retrieve the Form Data Using $_GET(), $_POST() and $_REQUEST() Variables
8. Study Of Server Side Validation and Page Redirection In PHP Design A Login Form and Validate that Form using PHP Programming
9. Study Of Cookies And Sessions In PHP Create Admin Login ,Logout form using session variables
10. Study Of MYSQL DDL, DML, DCL Commands Installation Of MYSQL 5.5 On windows and Executes their basic Commands

11. Study of MYSQL aggregate functions
12. Study of MySQL string, numeric and date functions
13. Study Of PHP Data Base Connectivity with MYSQL Write a PHP Code to make database connection, Create Data Base, Create Table In Mysql
14. Study Of MYSQL Data Base Operation Write a PHP code Insert, Delete, Update, Select the Data From Data Base
15. Study of Image Uploading in PHP Design A from which upload And Display Image in PHP 14) Mini Project in PHP

Course Outcome

After completing this lab course, the students will be able to:

CO1 : Understand the logic for a given problem. K1
CO2 : Recognize and understand the syntax and construction of C programming code. K2
CO3 : Know the steps involved in compiling, linking and debugging C code. K3
CO4 : Learn the methods of iteration or looping and branching, K4
CO5 : Make use of different data- structures like arrays, pointers, structures and files. K4

Mapping of COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	M	M	S	S	M	S
CO2	S	S	M	S	M	M	M	M	S	S	S	M
CO3	S	S	S	S	M	M	S	M	S	S	S	S
CO4	S	S	S	S	S	S	M	M	S	M	S	S
CO5	S	S	S	S	S	S	M	M	S	M	S	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

SEMESTER – IV

COURSE CODE	P21ITE411	CHOICE – I	L	T	P	C
ELECTIVE - I		OBJECT ORIENTED ANALYSIS AND DESIGN	4	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyse
Objectives	• To learn the basic principles of Objects and Object Oriented System Development Life Cycle. • Learn to apply the Unified Modelling Language(UML) by the use of elementary object–oriented analysis and design concepts. • To present UML concepts and techniques necessary in effectively use system requirements • To develop a robust design model. • Showing how implementation details of a system can be modeled.

UNIT - I : **Introduction To Object Oriented System Development:**
Introduction – Two Orthogonal views – object oriented Systems development Methodology – Object orientation – unified approach – Object Basics – object oriented philosophy – objects – classes – attributes – behavior and methods – Message passing -Encapsulation and information hiding – hierarchy – polymorphism – object relationship and associations– aggregation– a case study–advanced topics.

UNIT–II: Object Oriented System And Methodology Development:
Object oriented system development life cycle(SDLC) – development process – building high quality software – use-case driven approach – reusability –Object oriented methodologies – introduction – Booch methodology – Jacobson methodologies – patterns – frameworks – unified approach.

UNIT – III : **Unified Process And Use Case Diagrams**
Unified modeling language – introduction – static and dynamic models –modeling – unified modeling language -UML diagrams – UML class diagrams – Use-case diagram – UML dynamic modeling- model management –OOA process – introduction –difficulty in analysis – business object analysis – use-case driven object oriented analysis –business processing modeling – use-case model –developing effective documentation.

UNIT – IV : Object Classification
Object analysis – classification – common class patterns approach – use-case driven approach – CRC – naming classes – object relationships – associations – Super-Subclassrelationships–aggregation–classresponsibility–objectresponsibility-
Objectorienteddesign process and design axioms – introduction – design process – design axioms- design patterns.

UNIT – V : Design Classes:

Designing classes – introduction - object oriented design philosophy – UML object constraint – designing classes – class visibility – defining attributes – designingmethodsandprotocols–Packagesandmanagingclasses–Accesslayer–
Objectstorageandobject interoperability – introduction – object store and persistence – Database management systems– database organization and access control– distributed databases.

TEXTBOOK:

1. Ali Bahrami, Object Oriented Systems Development, Irwin Mc Graw Hill Publications, 1999.

REFERENCE BOOK

1. Grady Booch, Object Oriented Analysis and Design, Pearson, 2009.

COURSE OUTCOMES

CO1: Describe the basics of Object Oriented concepts	K1
CO2: Analyze the function in g methodologies provided by Booch and Jacobson; Introduction on unified approach.	K2
CO3: Illustration of UML diagrams applicable to various phases of software development.	K3
CO4: Study on Relationship between various objects in the application and various ways of their reorientations	K3
CO5: Import knowledge on packaging classes, distributing them among layers. Introducing the object-oriented databases.	K4

MAPPING OF COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	M	M	M	S	S	M	S
CO2	S	S	M	S	M	S	M	M	S	S	S	M
CO3	S	S	S	S	M	M	S	M	S	M	M	S
CO4	S	S	S	S	S	S	M	M	S	M	S	S
CO5	S	S	M	S	S	S	S	M	S	S	S	M

**S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark**

COURSE CODE	P21ITE412	CHOICE – II	L	T	P	C
ELECTIVE - I		INFORMATION & SYSTEM SECURITY	4	-	-	4

Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze
Objectives	• Learn about the threats in computer security. • Understand what puts you are at a risk and how to control it. • Learn about the Policies for Operating Systems, Models of Security • Controlling a risk is not eliminating the risk. • Learn about the Organizational Security Policies

UNIT 1: Introduction:

Notion of different types of securities : Information Security. Computer Security: Security Goals, Relation between Security-Confidentiality, Integrity, Availability and Authorization, Vulnerabilities- Principles of Adequate protection. Operating security, Database security, Program security, Network Security (Notions Only). Attacks: Threats, Vulnerabilities and controls. The kind of problems - Interception, Interruption, Modification, Fabrication. Computer Criminals: Amateurs, Crackers, Career Criminals. Methods of Defense: Control, Hardware Controls, Software Controls, Effectiveness of Controls.

UNIT 2: Program Security:

Secure programs: Fixing Faults, Unexpected Behaviour, Types of Flaws. Non-malicious program errors: Buffer overflows, Incomplete Mediation. Viruses and other malicious code: Why worry about Malicious Code, Kinds of malicious code, How viruses attach, How viruses gain control, Prevention, Control Example: The Brain virus, The Internet Worm, Web bugs. Targeted malicious code- Trapdoors, Salami Attack. Controls against program threats- Development Controls, Peer reviews, Hazard Analysis.

UNIT 3: Operating System Security:

Protected objects and methods of protection, Memory address protection- Fence, Relocation, Base/Bounds Registers, Tagged Architecture, Segmentation, Paging. Control of access to general objects- Directory, Access Control List. File protection mechanism- Basics forms of Protection, Single Permissions. Authentication: Authentication basics, Password, Authentication Process Challenge-response, Biometrics. Trusted Operating systems- Security Policies for Operating Systems, Models of Security- Requirement of security systems, Multilevel Security, Access Security, Limitations of Security Systems. Trusted Operating System Design- Elements, security features, assurance, system flaws and assurance methods.

UNIT 4: Database Security:

Security requirements- Integrity of Database, Confidentiality and Availability, Reliability and integrity, Sensitive data, Interface, Multilevel database, Proposals for multilevel security - Administrating Security: Security planning- Contents of a security Planning Team members,

commitment to a security plan, Business continuity Plans - Risk analysis- The nature of risk, steps of risk analysis - Arguments for and against risk analysis.

UNIT 5: Organizational Security Policies:

Purpose and goals of Organizational Security. Audience, Characteristics of a Good Security Policy. Nature of security Policies- Data sensitivity policy, Government Agency IT security policy. Physical security- Natural Disaster, Human Vandals, Interception of Sensitive Information. Legal, Privacy, and Ethical Issues in Computer Security: Protecting programs and data, Information and law, Rights of employees and employers, Software failures, Computer crime, Privacy, Ethical issues in computer society.

Text Books:
 1. C. P. Pfleeger, and S. L. Pfleeger, "Security in Computing", Pearson Education, 2015.
2. Matt Bishop, "Computer Security: Art and Science", Pearson Education, 2018.
3. Stallings, Cryptography And Network Security: Principles and practice, Pearson Education, 2017.

Reference Book :
   1. Michael E.Whitman, Mattord, Principles of information security, Thomson, 2011.

 COURSE OUTCOMES
   CO1: Analyze and resolve security issues in networks and computer systems to secure an infrastructure. K1
   CO2: Design, develop, test and evaluate program security K2
   CO3: Develop policies and procedures to manage enterprise security risks. K2
   CO4: Apply and resolve database security K3
   CO5: Evaluate and communicate organizational security issues K4

MAPPING OF COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	M	S	S	M	S	S	S	M
CO2	S	S	M	S	M	M	S	M	M	S	S	S
CO3	S	M	M	M	S	S	M	S	S	M	S	M
CO4	M	S	S	S	S	M	S	M	S	S	S	S
CO5	S	M	S	S	M	S	S	M	M	M	M	S

S – Strongly Correlating - 3 Marks   **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITE413	CHOICE – III	L	T	P	C
ELECTIVE – I		COMPUTATIONAL LINGUISTICS	4	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze
Objectives:	- To understand the computing Human Languages - To know the various models for computing human languages - To know the NLP Application - To have competence of linguistic names which are indispensable for computing natural languages - To develop a rule based system.

Unit 1: Introduction to Tamil Linguistics

Tamil Computing Tools Development: Tamil Text Preprocessing tools: Sentence Splitter, Tokenizer, Word boundary identifier. Hands on these tools.

Unit 2: Shallow Parser

What is Shallow Parsing and How to develop a Shallow Parser (Rule based System development) Shallow parsing is an analysis of a sentence which first identifies constituent parts of sentences (nouns, verbs, adjectives, etc.) and then links them to higher order units that have discrete grammatical meanings (noun groups or phrases, verb groups, etc.). It is suitable for complex NLP applications; Morphological Analyser, Part of Speech Tagger, NP/VP Chunker, Clause Boundary Identifier.

Unit 3: Deep Parsing

Deep Parsing: Deep parsing is the search strategy which will give a complete syntactic structure to a sentence. It is the task of parsing a limited part of the syntactic information from the given task. Dependency Parser for Tamil; How to develop a dependency parser

Unit 4: Machine Translation

Introduction – Machine Translation and its Types: Rule Based Machine Translation Technology – Statistical Machine Translation Technology – Neural Machine Translation - Syntax Based Machine Translation – Advantgaes and Disadvantages – Machine Trasnlation vs. Human Translation – Applications of Machine Translation.

Unit 5: Applications of CL

Corpus Development in Tamil: Content Development using various methods such as Wikipedia and Blocks. Annotated Corpus of various Grammatical categories in Tamil using , Annotation tool (PALINKA for Tamil)

Text Books

1. kaNippoRiyil Tamil/கணிப்பொறியில்தமிழ் · T.Prakash/த.பிரகாஷ்

Perikam∴.பெரிகாம் ,(நூல்வெளியீடுமற்றும்விற்பனை), 36,

அசீஸ்முல்க்இரண்டாம்தெரு , ஆயிரம்விளக்கு , சென்னை6. Tamil; 2005

2. Iyarkai Mozhiyaaivu Thamizh; Prof. subbaiya pillai/ கு . சுப்பையாபிள்ளை

உலகத்தமிழ்ஆராய்ச்சிநிறுவனம் ; 2012.

3. GATE.ac.uk - releases/gate-2.0alpha3-build516/doc/userguide.html

4. NLTK Website : 1. Language Processing and Python (nltk.org)

5. AU-KBC Tools: http://78.46.86.133:8080/aukbc-nlp/
6. Search Engine AU-KBC: Searchko: www.searchko.co.in
7. Corpus Linguistics: An Introduction Kindle Edition; Author: Niladri Sekhar Dash; :Pearson; 1st edition (1 October 2007);
8. An Introduction to Corpus Linguistics; Author: Graeme Kennedy; Routledge:1998
9. PALinkA: A high-end tool for syntactic and semantic annotation for Tamil Text: Customized by AU-KBC for Tamil . To download: http://78.46.86.133/PALinkA.tar.gz
10. Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit 1st Edition; Steven Bird , Ewan Klein , Edward Loper
11. Machine Translation ; Pushpak Bhattacharyya ; Chapman and Hall/CRC; 2015

Course Outcomes:

After successful completion of the course, Student shall be able to:

CO1: Develop Tamil Computing Tools.	K1, K4
CO2: Analyze sentences using Shallow Parser.	K4
CO3: Extract Syntactic information using Deep Parser.	K4
CO4: Apply Machine Translation.	K3
CO5: Develop Tamil Corpus.	K3

MAPPING OF COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	M	M	S	S	M	M	M	S
CO2	M	S	S	M	M	M	S	M	S	M	M
CO3	M	M	S	S	S	M	M	S	M	M	S
CO4	S	M	S	M	M	S	M	M	M	M	S
CO5	M	M	S	S	S	M	S	S	M	M	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITE421	CHOICE – I		L	T	P	C
ELECTIVE -II		**CLOUD COMPUTING**		**4**	**-**	**-**	**4**
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze					

Objectives	- To learn the concepts of cloud Architecture - To learn the concepts of cloud computing - To learn cloud services and platforms - To understand real-world cloud applications - To develop the application using clouds concepts

UNIT I: Cloud Architecture and Model:

Technologies for Network - Based System – System Models for Distributed and Cloud Computing NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs. Private Cloud – Cloud Solutions – Cloud ecosystem – Service management – Computing on demand.

UNIT II: Virtualization:

Basics of Virtualization - Types of Virtualization – Implementation Levels of Virtualization-Virtualization Structures - Tools and Mechanisms – Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data - Center Automation.

UNIT III: Cloud Infrastructure:

Architectural Design of Compute and Storage Clouds –Layered Cloud Architecture Development – Design Challenges – Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

UNIT IV: Programming Model:

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments - Eucalyptus, Open Nebula, Open Stack, Aneka, Cloud-Sim.

UNIT V: Security in The Cloud:

Security Overview –Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

Text Book:

1. Kai Hwang, Geoffrey CFox, Jack G Dongarra, - Distributed and Cloud Computing, From

Parallel Processing to the Internet of Things Morgan Kaufmann Publishers, 2012.

Reference Books:
1. John W.Ritting house and James F.Ransome -Cloud Computing: Implementation, Management, and Security, , CRC Press, 2010.
2. Anthony Velte, Robert Elsenpeter -Cloud Computing, A Practical Approach, To by Velte, , TMH, 2009.
3. Kumar Saurabh - Cloud Computing – Insights into New–Era Infrastructure, , Wiley India, 2011.
4. James E.Smith, Ravi Nair, Elsevier / Morgan Kaufmann -Virtual Machines: Versatile Platforms for Systems and Processes, 2005.

COURSE OUTCOMES

CO1: Describe the Cloud Architecture and Model. K1
CO2: Analyze the basics and applications of Virtualization. K3
CO3: Understand the different Cloud Infrastructure. K2
CO4: Understand different programming model. K4
CO5: Discuss the Cloud Security Challenges and Risks. K4

MAPPING OF COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	M	S	M	S	S	S	S
CO2	S	S	S	S	M	S	M	M	S	S	S	S
CO3	S	M	M	M	S	S	S	m	S	M	S	M
CO4	M	S	S	S	S	M	S	M	S	M	S	S
CO5	S	M	S	S	M	S	M	M	M	M	M	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITE422	CHOICE – II	L	T	P	C
ELECTIVE -II		**SOFT COMPUTING**	4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				

Objectives	- To give knowledge about the soft computing theories to the students, fundamentals of non-traditional technologies and approaches to solve in real-world problems. - To learn and apply artificial neural networks, fuzzy sets, fuzzy logic, and genetic algorithms in problem solving and use of heuristics based on human experience. - To introduce the ideas of fuzzy sets, fuzzy logic to become familiar with neural networks - To learn from available examples and generalize to form appropriate rules. - To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations

UNIT – I: Neural Networks:

(Introduction and Architecture) Neuron, Nerve Structure and Synapse, Artificial Neuron and its Model, Activation Functions, Neural Network Architecture: Single Layer and Multilayer Feed Forward Networks, Recurrent Networks. Various Learning Techniques; Perception and Convergence Rule, Auto- Associative and Hetro-Associative Memory.

UNIT – II: Neural Networks:

(Back Propagation Networks) Architecture: Perceptron Model, Solution, Single Layer Artificial Neural Network, Multilayer Perception Model; Back Propagation Learning Methods, Effect of Learning Rule Co-Efficient ;Back Propagation Algorithm, Factors Affecting Back Propagation Training, Applications.

UNIT – III: Fuzzy Logic:

(Introduction) Basic Concepts of Fuzzy Logic, Fuzzy Sets and Crisp Sets, Fuzzy Set Theory and Operations, Properties of Fuzzy Sets, Fuzzy and Crisp Relations, Fuzzy to Crisp Conversion.

UNIT – IV: Fuzzy Logic:

(Fuzzy Membership, Rules) Membership Functions, Interference in Fuzzy Logic, Fuzzy If-Then Rules, Fuzzy Implications and Fuzzy Algorithms, Fuzzifications and Defuzzificataions, Fuzzy Controller, Industrial Applications

UNIT – V: Genetic Algorithm:

Basic Concepts, Working Principle, Procedures of GA, Flow Chart of GA, Genetic Representations, (Encoding) Initialization and Selection, Genetic Operators, Mutation, Generational Cycle, Applications.

Reference Book(s):

1. David E. Goldberg, Genetic Algorithm in Search Optimization and Machine Learning Pearson Education India, 2013.
2. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications, 2nd Edition, 2011
3. N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.

Text Book:
1. J.S.R.Jang, C.T.Sun.E.Multani, "Neuro-Fuzzy and Soft Computing", PHI, Pearson, 2004

COURSE OUTCOMES

   CO1: Recall   the basic concepts and techniques of Soft Computing K1
   CO2: Understand   Biological and Artificial Neural Network and Explain the types of Neural Networks K2
   CO3: Analyze various fuzzy models in developing fuzzy inference systems to be appropriate with specific real time problems K3
   CO4: Apply the genetic algorithms to combinatorial optimization problems K3
   CO5: Analyze and Design the Optimization techniques Swam Intelligence and Antcolony optimization K4

MAPPING OF COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	S	M	S	M	S	S	S	S
CO2	S	S	M	S	M	S	M	M	M	S	S	S
CO3	S	M	M	M	S	S	M	S	S	M	S	M
CO4	M	S	S	S	S	M	S	M	S	S	S	S
CO5	S	M	S	S	S	M	M	M	M	M	M	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITE423	CHOICE – III		L	T	P	C
ELECTIVE -II		**WIRELESS SENSOR NETWORKS**		4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze					
Objectives		• To study the Applications of wireless sensor .networks • To study the concepts of sensor networks. • To study the research issues in different layers • To learn about the sensor network architecture. • To write a program in a sensor modes using data centric programming.					

UNIT I: Introduction:
The vision, Networked wireless sensor devices, Applications, Key design challenges. Network deployment: Structured versus randomized deployment, Network topology, Connectivity, Connectivity using power control, Coverage metrics, Mobile deployment.

UNIT II: Localization:
Issues & approaches, Coarse – grained & Fine – grained node localization, Network - wide localization, Theoretical analysis of localization techniques. Synchronization: Issues & Traditional approaches, Fine – grained clock synchronization, and Coarse – grained data synchronization.

UNIT III: Wireless characteristics:
Basics, Wireless link quality, Radio energy considerations, SINR capture model for interference. Medium - access and sleep scheduling: Traditional MAC protocols, Energy efficiency in MAC protocols, Asynchronous sleep techniques, Sleep – scheduled techniques, and Contention – free protocols.

UNIT IV: Sleep – based topology control:
Constructing topologies for connectivity, constructing topologies for coverage, SetK – cover algorithms. Routing: Metric – based approaches, Routing with diversity, Multi - path routing, Lifetime - maximizing energy – aware routing techniques, Geographic routing, Routing to mobile sinks.

UNIT V: Data - centric networking:
Data - centric routing, Data - gathering with compression, Querying, Data - centric storage and retrieval, the database perspective on sensor networks. Reliability and congestion control: Basic mechanisms and tunable parameters, Reliability guarantees, Congestion Control, Real-time scheduling.

Reference Book:

1.   Kazem Sohraby, Daniel Minoli, Taieb ZnatiZ "Wifeless Sensor Networks Technology Protocol and Applications", 1st Edition,Wiley Publication, 2016

Text Books:

1.   Kazem Sohraby, Daniel Minoli, Taieb Znati -Wireless Sensor Networks: Technology, , Protocols, and Applications, Wiley Inter Science, 2007.
2.   Jun Zheng, Abbas Jamalipour, "Wireless Sensor Networks: A Networking Perspective", Wiley-IEEE Press - 2009.
3.   Mohammad S. Obaidat, Principles of Wireless Sensor Networks, Cambridge University Press-2014

COURSE OUTCOMES

CO1: Discuss about Networked wireless sensor devices, design challenges and topology K1
CO2: Analyze the Localization, synchronization issues and approaches K2
CO3: Understand the wireless characteristics, MAC protocols and contention free protocols K2
CO4: Construct topology for connectivity, coverage and routing techniques. K3
CO5: Discuss about the data centric routing and Reliability and congestion control K4

MAPPING OF COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	S	M	S	M	S	S	S	M
CO2	S	S	M	S	M	S	M	M	M	S	S	S
CO3	S	M	M	M	S	M	S	S	S	M	S	M
CO4	M	S	S	S	M	S	M	M	S	S	S	S
CO5	S	M	S	S	M	S	S	M	M	M	M	S

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

NON MAJOR ELECTIVE
OFFERED FOR OTHER DEPARTMENT STUDENTS

COURSE CODE	P21ITN211	CHOICE – I	L	T	P	C
SEMESTER - II		C PROGRAMMING	4	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze
Objectives	• To introduce the basic knowledge of programming fundamentals of C language. • To impart writing skill of C programming and solving problems to the students. • To impart the concepts like looping, array, etc.,. • To impart the knowledge on functions and pointers. • To impart knowledge on file concepts to use it for data handling.

Lab Exercise:

Simple Programs:
1. Finding the largest, smallest among three numbers
2. Generate the Fibonacci sequence

Control Structures:
1. Find whether a number is prime or not
2. Find whether a given number is a perfect or not
3. Find the factorial of a number

Arrays:
1. Program for Sorting
2. Program to search an element
3. Find whether given string is a palindrome or not
4. Perform the addition of two matrices
5. Perform subtraction of two matrices
6. Perform multiplication of two matrices

Functions:
1. Program to apply Recursion
2. Program for Call by Value

Pointers:
1. Program to perform addition
2. Program for swapping two numbers

Structures:
1. Program to print student information using structures

> 2. Program for Array of structures
>
> File:
>
> 1. Program for applying File operations
> 2. Program to get n numbers and find odd and even numbers using file.

Course Outcome

After completing this lab course you will be able to:

CO1 : Understand the logic for a given problem. K1
CO2 : Recognize and understand the syntax and construction of C programming code. K2
CO3 : Know the steps involved in compiling, linking and debugging C code. K3
CO4 : Learn the methods of iteration or looping and branching, K4
CO5 : Make use of different data- structures like   arrays, pointers, structures and files. K4

Mapping of COs with POs and PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	M	M	S	S	M	S
CO2	S	S	M	S	M	M	M	M	S	S	S	M
CO3	S	S	S	S	M	M	S	M	S	S	S	S
CO4	S	S	S	S	S	S	M	M	S	M	S	S
CO5	S	S	S	S	S	S	M	M	S	M	S	S

   S – Strongly Correlating - 3 Marks   M-Moderately Correlating - 2 Marks

COURSE CODE	P21CAN212	CHOICE – II	L	T	P	C
SEMESTER - II		PHOTO DESIGNING	4	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze
Objectives	• Demonstrate the basics of Photoshop • Demonstrate knowledge of image resolution • Demonstrate image size, and image file format for web, video, and to print. • Demonstrate knowledge of design principles, elements, and image composition. • Demonstrate knowledge of typography errors.

Unit I: Introduction
Getting into Photoshop: Introduction - Best in Photoshop 7.0 - Photoshop Interface-Saving the File-Importing Existing File.

Unit II: Editing and Retouching
Editing and Retouching: Working with Selections-Getting started with the Selection tool-Selection with Rectangle Marquee Tool-Selection with Elliptical Marquee Tool-Moving a Selection-Moving with Keyboard Shortcut-Selection with the Magic Wand-Selection with Lasso Tool-Adding and Subtraction Selection-Selection with the Magnetic Lasso-Transforming a Selection-Combining Selection Tools-Cropping the Completed Image-Quick Mask tool to make Selection-Enabling the Quick Mask Mode-Adjusting Quick Mask Setting-Patch Tool-Paint Tools-Image Color Adjustments.

Unit III: Photoshop
Making Artistic use of Photoshop: Painting Tools-Working with Brushes-Drawing-Eraser Tool-Brushes Palette-Pen Tool-Selecting an Image with Pen Tool-Editing and Cleaning Tools-Clone Stamp Tool-Healing Brush-Image Resizing.

Unit IV: Tools of Photoshop
Building Original Art work: Layers-Creating A Layer -Layer Mask-Transform-Custom shapes -Create Your own Custom shapes.

Unit V: Applications of Photoshop
Transforming Images with Filters: Filters-Text Tool-Text Wrap-Try it.

Text Book:
J. Jenitha, A. Diana, "Adobe Photoshop 7.0 - A Novice Guide" ACCA Publication, 2012.

Reference Books:

1. Deke McClelland, Laurie Ulrich Fuller Robert C. Fuller, "Photoshop CS2 Bible", Photoshop® CS2 Bible, Professional Edition, 2005.

2. "Photoshop CS6 in Simple Steps", Kogent Learning Solutions Inc, Dreamtech Press, 2013.

COURSE OUTCOMES (CO):

CO1	Understand the different dimensions of digital data.	K1
CO2	Apply the concept of data classification on different types of data	K2
CO3	Analyze the characteristics of different patterns of data	K3
CO4	Implement the concept of big data in different scenarios	K4
CO5	Analyze Transforming Images with Filters	K4

Mapping of COs with POs and PSOs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	M	S	M	S	S	S
CO3	S	S	S	S	S	M	S	S	S	M	S	S
CO4	S	S	M	S	S	S	S	S	S	S	S	M
CO5	S	S	M	S	S	M	M	S	S	S	S	M

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks

COURSE CODE	P21ITN213	CHOICE – III	L	T	P	C
SEMESTER - II		**BIG DATA ANALYTICS**	4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				

Objectives:	- To understand and apply scaling up machine learning techniques - To understand the associated computing techniques and technologies. - To identify the characteristics of datasets - To compare the trivial data and big data for various applications. - To recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.

Unit- I: Data Evolution

Data Development Time Line – ICT Advancement-a Perspective – Data Growth-a Perspective – IT Components-Business Process – Landscape-Data to Data Science – Understanding data: Introduction – Type of Data: Numeric – Categorical – Graphical – High Dimensional Data — Data Classification – Hot Data – Cold Data – Warm Data – Thick Data – Thin Data - Classification of digital Data: Structured, Semi-Structured and Un-Structured.

Unit- II: Sources Of Data

Time Series – Transactional Data – Biological Data – Spatial Data – Social Network Data - Data Evolution – Data Sources
Data Science: Data Science-A Discipline – Data Science vs Statistics – Mathematics - Programming Language - Database, - Machine Learning. Data Analytics Relation: Data Science, Analytics, Big Data Analytics.

Unit- III: Data Science Components

Data Engineering, Data Analytics-Methods and Algorithm, Data Visualization Big Data: Introduction To Big Data: - Evolution What is Big Data – Sources of Big Data. Characteristics of Big Data 6Vs – Big data- Challenges of Conventional Systems.

Unit- IV: Data Processing Models

Data Processing Models – Limitation of Conventional Data Processing Approaches – Big Data

Myths - Data Discovery-Traditional Approach, Big Data Technology: Big Data Exploration - Data

Augmentation – Operational Analysis – 360 View of Customers – Security and Intelligence

Unit- V: Use Cases
Big Data Use cases –Big Data Technology Potentials – Limitations of Big Data and Challenges- Big Data Roles Data Scientist , Data Architect, Data Analyst – Skills – Case Study : Big Data – Customer Insights – Behavioral Analysis – Big Data Applications - Marketing – Retails – Insurance – Risk and Security – Health care.

Text Book:

1.V. Bhuvaneswari, T. Devi, "Big Data Analytics: A Practitioner's Approach" Sci-Tech Publishers Chennai 2016.

Reference Books:

1. Han Hu, Yonggang Wen, Tat-Seng, Chua, XuelongLi,"Toward Scalable Systems for Big data Analytic" (2016)
2. Seema Acharya, Subashini Chellappan, "Big Data Analytics", Wiley, (2015).

Course Outcome:

CO1 : Understand the key issues in big data management and its associated applications in intelligent business and scientific computing. K1

CO2 : Acquire fundamental enabling techniques and scalable algorithms like Hadoop,

CO3 : Understand Map Reduce and NO SQL in big data analytics. K2

CO4 : Interpret business models and scientific computing paradigms, and apply software tools for big data analytics. K3

CO5 : Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc. K4

MAPPING OF COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	M	S	S	S	S
CO2	S	S	M	S	S	M	M	S	S	S	S
CO3	S	M	M	M	M	M	M	S	M	S	S
CO4	M	S	M	S	S	M	M	S	S	S	S
CO5	S	M	S	S	M	S	M	M	S	S	S

S – Strongly Correlating - 3 Marks   **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITN214	CHOICE – IV	L	T	P	C
SEMESTER - II		DIGITAL IMAGE PROCESSING	4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				
Course Objectives		• To understand the basic fundamental concept of an image processing • To know the concepts of Image techniques, sharpening and filtering ideas. • To gain the knowledge about image patterns • To gain the knowledge about image compression and segmentation • To gain knowledge in structures and image compressions				

Unit- I: Digital Image Fundamentals
Image formation, Image transforms – Fourier transforms, Walsh, Hadamard, Discrete cosine, Hostelling transforms.
Unit-II: Image Enhancement and Restoration
Histogram modification techniques - Image smoothening – Image sharpening - Image restoration - Degradation model – Noise models- Spatial filtering – Frequency domain filtering
Unit- III: Image compression and segmentation:
Compression Models - Elements of information theory - Error free compression - Image segmentation – Detection of discontinuities - Edge linking and boundary detection – Thresholding – Region based segmentation – Morphology
Unit- IV: Representation and description:
Representation schemes – Boundary descriptors – Regional descriptors –Relational descriptors
Unit- V: Object Recognition and Interpretation
Patterns and pattern classes - Decision - Theoretic methods - Structural methods.

Text Book:
1.Gonzalez, R.C., Woods, R.E., "Digital Image Processing", 2nd Edition, Pearson Education ,2002.

Reference Books:

1.Anil Jain, K., "Fundamentals of Digital image Processing" , Prentice all of India,1989.

2.Sid Ahmed, "Image Processing", McGraw Hill, New York, 1995.

Course Outcomes (CO):

CO1	To remember the basic image concepts.	K1
CO2	To know the image sharpens enhancement and compression models.	K2
CO3	To apply various image techniques like edge linking and boundary detection.	K3
CO4	To analyze basic requirements of image processing like structure, compression and resolution.	K4
CO5	To analyze segmentation techniques	K4

MAPPING OF COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	M	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	M	S	S	S	S	M
CO5	S	S	M	S	S	S	M	S	S	S	S	M

S – Strongly Correlating - 3 Marks **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITN215	CHOICE – V		L	T	P	C
SEMESTER - II		**MOBILE COMPUTING**		4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze					

Objectives	• To learn about the Mobile Computing Architecture • To learn the basic concepts of Mobile Computing and its Applications. • To provide various emerging technologies in Mobile computing • To provide various emerging techniques in mobile services. • To gain knowledge about GSM, GPRS, CDMA and 3G.

Unit I: Introduction

Mobility of bits and bytes, wireless- The beginning, mobile computing – Networks – Middleware and Gateways – Application and Services – Developing Mobile computing Applications – Security in Mobile Computing.

Unit II   Mobile Computing Architecture

History of Computers – History of Internet – Internet – The ubiquitous network – Architecture for Mobile Computing– Three Tire Architecture - Design consideration for Mobile Computing- Mobile Computing through Internet – Making existing Applications Mobile – Enabled

Unit - III   Mobile Communication

Global System For Mobile Communication (GSM): Global system for Mobile Communication- GSM Architecture – GSM entities – Call routing in GSM, PLMN Interface – GSM Address Identifiers – Network aspects in GSM- GSM frequency allocation – Authentication and Security. Short Message Service (SMS) : Mobile Computing over SMS - Short Message Service- Value added services through SMS – Accessing the SMS bearer.

Unit – IV: General Packet Radio Service (GPRS)

General Packet Radio Service (GPRS) : Introduction – GPRS and packet data network – GPRS network architecture – GPRS network operations – Data services in GPRS – Applications for GPRS- limitations of GPRS – Billing and Charging in GPRS.Wireless Application Protocol (WAP): Introduction – WAP – MMS- GPRS application

Unit V   CDMA AND 3G

CDMA AND 3G: Introduction – Spread spectrum technology – IS 95- CDMA versus GSM – Wireless data –Third generation network – Application on 3G. WIRELESS LAN : Introduction – Wireless LAN advantages – IEEE 802.11 standards – Wireless LAN architectures – Mobility in Wireless LAN – Deploying Wireless LAN – Mobile Ad-hoc network and sensor network – Wireless LAN Security – WiFi versus 3G.

Text Book:

1.Ashok K Talukder, Roopa R Yavagal, "Mobile Computing", Tata McGraw Hill Publishing CompanyLtd, 2005.

Reference Books:
1. Jochen Schiller, (2004), "Mobile Communications", Second Edition, AddisionWesely Publications.
2. UWE Hansmann, Lothe rMerk, Martin.S, (2006), "Principles of Mobile Computing", Second Edition, Springer publications.
3 Jeyasri Arokiamary,(2005), "Mobile Communications", First Edition, Anuradha Agencies.

Course Outcomes (CO)

CO1	member the concept of Wireless LANs, PAN, Mobile Networks	K1
CO2	Understand positioning techniques of location-based services and applications	K2
CO3	Apply all techniques used in the GSM and GPRS	K3
CO4	Analyze CDMA and wireless LANS.	K4
CO5	Understand GPRS network operation	K2

MAPPING OF COs with POs and PSOs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	M	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	M	S	S	S	S	M
CO5	S	S	M	S	S	S	M	S	S	S	S	M

S – Strongly Correlating - 3 Marks   **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITN216	CHOICE – VI	L	T	P	C
SEMESTER - II		DATA COMMUNICATION AND NETWORKING	4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				

Objectives:	
	- To educate the concepts of terminology and concepts of the OSI reference model, the TCP/IP reference model. - To be familiar with the concepts of protocols such as TCP, UDP and IP, network interfaces - To design/performance issues in local area networks and wide area networks. - Introduce the student to a network routing for IP networks - To check how a collision occurs and how to solve it and frame it with created and character count of each frame.

Unit -I: **Introduction**

Introduction To Data Communications And Networking: Introduction-Fundamental Concepts - Data Communication – Protocols – Standards – Signal Propagation – Analog and Digital Signals. Information Encoding: Representing Different Symbols – Minimizing Errors - Analog and Digital Transmission Methods – Modes of Data Transmission and Multiplexing. Transmission Errors: Detection and Correction.

Unit- II: Transmission Media

Transmission Media: Guided Media - Unguided Media. Network Topologies: Mesh, Star, Tree, Ring, Bus – Switching: Circuit switching, Message switching, Packet switching. Routing Algorithms: Routers and Routing – Factors affecting Routing Algorithms – Routing Algorithms – Approaches to Routing – Network Protocols and OSI Model

Unit- III: LAN

Local Area Networks (LAN), Metropolitan Area Networks (MAN) and Wide Area Networks (WAN): LAN– Ethernet – MAN – Switched Multimegabit Data Services (SMDS) - WAN – WAN Architecture - WAN Transmission Mechanism - WAN Addressing – Packet Forwarding – Aloha - Integrated Services Digital Network (ISDN) – X.25 Protocol – Frame Relay.

Unit- IV: ATM

ynchronous Transfer Mode (ATM) - Internetworking Concepts, Devices, Internet Basics, History and Architecture – An Introduction to TCP / IP, IP, ARP, RARP, ICMP.

Unit- V: Transmission Control Protocol

Features of TCP, Relationship between TCP and IP *, Ports and Sockets, TCP connections, What makes TCP Reliable, TCP Packet Format – User Datagram Protocol (UDP): UDP Packet, Difference between UDP and TCP – Domain Name System (DNS) – Electronic Mail (Email) – File Transfer Protocol (FTP).

Text Book:
1. Achyut S. Godbole, (2007), "Data Communications and Networks", Ninth reprint, Tata McGraw- Hill Publishing Company Limited.

Reference Books:
1. Behrouz A. Forouzan, (2007), "Data Communications and Networking", Second Edition Update, Nineteenth reprint, Tata McGraw-Hill Publishing Company Limited.
2. Andrew S. Tanenbaum, (2001), "Computer Networks", Third Edition, Prentice Hall

Course Outcomes (CO)

CO1	Remember the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks.	K1
CO2	Understand Internet structure and can see how standard problems are solved and the use of cryptography and network security	K2
CO3	Apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission.	K3
CO4	Analyze the requirements for a given organizational structure and select;	K4
CO5	Understand the most appropriate networking architecture and technologies	K2

MAPPING OF COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	M	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	M	S	S	S	S	S	M
CO5	S	S	M	S	S	S	M	S	S	S	S	M

S – Strongly Correlating - 3 Marks   **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITN217	CHOICE – VII		L	T	P	C
SEMESTER - II		**CLOUD COMPUTING**		4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze					

Objectives:	- To understand the basic knowledge about the cloud architecture. - To understand the knowledge of Cloud computing techniques - To gain knowledge of cloud services and cloud security. - To be able to understand about the Cloud Segment - To be able to understand Cloud Deployment Models and key cloud companies.

Unit –I: Introduction
Introduction - cloud computing at a glance – Historical development – Building cloud computing environment.

Unit- II: Parallel and Distributed Computing
Principles of parallel and distributed computing – Eras of computing – parallel Vs distributed computing – Elements of parallel computing – Elements of distributed computing – Technologies for distributed computing.

Unit- III: Architecture of Cloud Computing
Cloud Computing Architecture: Introduction – Cloud reference model –   Types of clouds – Organizational aspects.

Unit- IV: Applications of Cloud Computing
Cloud Applications: Scientific   Applications: Healthcare   –Business and Consumer Applications: CRM and ERP – Media Applications – Multiplayer Online gaming

Unit- V:Cloud Security
Cloud Security – Cloud Computing Concept – Cloud Risk – Cloud Security Tools and Techniques – Data Production in Cloud – Cloud Storage – Data Loss Prevention – Cloud Application Security – Security Assertion Markup Language.

Text Books:
1. Rajkumar Buyya, Christian vecchiola , Thamarai selvi, (2013), "Mastering Cloud computing", Mc Gram Hill Publication. (UNIT – I to UNIT –IV)
2. Charles P.Pfleeger, Shari Lawrence Pfleeger, Deven N.Shan, (2007), "Security in Computing", Fourth Edition, Prentice Hall Publication. (UNIT –V)

Reference Book:
1. Judith Hurwitz, Robin Bloon, (2009), "Cloud Computing for Dummies"

Course Outcomes (CO)

CO1	Identify the architecture and infrastructure of cloud computing including SaaS, PaaS, IaaS, public cloud, private cloud, and hybrid cloud.	K1
CO2	Understand the core issues of cloud computing, security, privacy, and interoperability.	K2
CO3	Apply the appropriate technologies and approaches for the related issues in Cloud Computing.	K3
CO4	Analyze the suitable cloud computing solutions and recommendations according to the applications used.	K4
CO5	Understand the concepts of Multiplayer Online gaming	K2

MAPPING OF COs with POs and PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	S	M	M	S	S	S	S
CO2	S	S	S	S	M	S	M	M	S	S	S	S
CO3	S	M	M	M	M	S	S	M	S	M	S	M
CO4	M	S	S	S	S	M	S	M	S	M	S	S
CO5	M	S	S	S	S	M	M	M	S	M	S	S

S – Strongly Correlating - 3 Marks   **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITV41	SOFT COMPUTING LAB	L	T	P	C
SEMESTER - I			-	-	-	2
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				
Course Objectives		• To develop the skills in soft computing by writing a program • To gain a basic understanding De Morgans law property in neural network • To gain a basic understanding of neural network theory and fuzzy logic theory. • Introduce new concepts in artificial neural networks. • To introduce fuzzy theory from an engineering perspective				

Section-A(Fuzzy Logic)

1. a) Write a program (m.file) to calculate union, intersection, complement and difference of two fuzzy sets.
b) Write a program (m.file) to calculate the Demorgan's Law.
2. Find whether the given matrix is (a) reflexive (b) tolerance and (c) transitivity matrix or not.
3. Find whether the given matrix is symmetry or not.
4. Find the fuzzy relation between two vectors R and S

$R=$
0.7   0.5
0.8   0.4
$S =$
0.9   0.6   0.2
0.1   0.7   0.5

Using max–product and max-min method

5. a) Use command line commands to display the Gaussian membership function. Given x $=0$–10 with increment of 0.1 and Gaussian function is defined between 0.5 and -5. b) Use command line commands to display the triangular membership function. Given $x = 0$–10 with increment of 0.2 triangular membership function is defined between [3 4 5].
6. Illustrate different types of generalized bell membership functions using a program
7. Using program find the crisp lambda cut set relations for $\lambda=0.2$, the fuzzy matrix is given

by

$R=$

0.2	0.7	0.8	1
1	0.9	0.5	0.1
0	0.8	1	0.6
0.	0.4	1	0.3

8. Temperature control of the reactor where the error and change in error is given to the controller. Here the temperature of the reactor is controlled by the temperature bath around the reactor thus the temperature is controlled by controlling the flow of the cool antin to the reactor.Form the membership function and the rule base using FIS editor.

9. Consider the water tank with following rules
a) IF (level is okay) THEN (valve is no_change)(1)
b) IF (level is low) THEN   (valve is open_fast)(1)
c) IF (level is high) THEN (valve is close_fast)(1)

Using Mamdani method and max–min method for fuzzification and method of centroid for de-fuzzification method construct a FIS. Before editing that rules, membership functions must be defined with membership function editor.

10. a)Formafuzzysystem,whichapproximatesfunction$f$,when$x[-10,10]$.Repeat the same by adding random, normally distributed noise with zero mean and Unit variance.

b)Simulate the output when the input is sin(t). Observe what happens to the signal shape at the output.

11. Use Fuzzy Logic Toolbox to model the tip given after a dinner for two, where the food can be disgusting, not good, bland, satisfying, good, or delightful, and the service can be poor, average, or good. To get started, you type fuzzy in a window. Then use the fuzzy inference system and membership function editors to define and tune your rules.

Section-B (Neural Network)

12. Design networks of McCulloch –Pitts neurons that implement logical NOT, AND and OR gates. Draw each network and label all the weight and threshold values.

13. Derive expressions for the weights and thresholds of a McCulloch – Pitts neuron that can compute the following input-output mappings:

in1 in2 out

(:
((
] (
] (

Write code for the above ANN.

14. Investigate the use of back-propagation learning using asigmoidal non-linearity to achieve one-to-one mapping, as described here:

1.f(x) =1/x	1	$\leq x \leq 100$
2.f(x) =log₁₀x,	1	$\leq x \leq 10$
3.f(x)=exp(-x),	1	$\leq x \leq 10$
4.f(x) =sinx,	0	$\leq x \leq \pi/2$

For each mapping, do the following:

(a) Set up two sets of data, one for network training, and the other for testing.

(b) Use the training data set compute the synaptic weights of the network, assumed to have a single hidden layer.

(c) Evaluate the computation accuracy of the network by using the test data. Use a single layer but with a variable number of hidden neurons. Investigate how the net work performance is affected by varying the size of the hidden layer.

15. The data presented in the Table P4.17 show the weights of eye lenses of wild Australian rabbits as a function of age. No simple analytical function can exactly interpolate these data, because we do not have a single valued function. Instead, we have a nonlinear least squares model of this dataset, using a negative exponential, as described by

$Y = 2.33.846(1 - \exp(-0.006042x)) + \square$

Where   is an error term.

Using the back - propagation algorithm, design a multiplayer perceptron that provides a non linear least - squares approximation to this data set. Compare your result against the least – sequence model described.

TableP4.17Weights of Eye Lenses of Wild Australian Rabbits

Ages (days)	Weights (mg)	Ages (days)	Weights (mg)	Ages (days)	Weights (mg)	Ages (days)	Weights (mg)
15	21.66	75	94.6	218	174.18	338	203.23
15	22.75	82	92.5	218	173.03	347	188.38
15	22.3	85	105	219	173.54	354	189.7
18	31.25	91	101.7	224	178.86	357	195.31
28	44.79	91	102.9	225	177.68	375	202.63
29	40.55	97	110	227	173.73	394	224.82
37	50.25	98	104.3	232	159.98	513	203.3
37	46.88	25	134.9	232	161.29	535	209.7
44	52.03	142	130.68	237	187.07	554	233.9
50	63.47	142	140.58	26	176.13	591	234.7
50	61.13	147	155.3	258	183.4	648	244.3
60	81	147	152.2	276	186.26	660	231
61	73.09	150	144.5	285	189.66	705	242.4
64	79.09	159	142.15	300	186.09	723	230.77

65	79.51	165	139.81	301	186.7	756	242.57
65	65.31	183	153.22	305	186.8	768	232.12
72	71.9	192	145.72	312	195.1	860	246.7
75	86.1	195	161.1	317	216.41		

Section –C (Genetic Algorithm)

16. Write a program to implement Roulette wheel and ranking selection method.

a) Write a program to maximize a function $f(x,y) = x\sin(4\pi x) + y\sin(20x)$ subject to $-3.0 \le x \le 12.1$ $4.1 \le y \le 5.8$

Reference Books:

1. N.P.Padhy, S.P.Simon, Soft computing with P programming, Oxford University Press, First Edition, 2015.

Course Outcomes

Upon completion of the course, the student are expected to

CO1: Recall the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory K1
CO2: Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic K2
CO3: To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations K2
CO4: Apply the appropriate learning rules for each of the architectures and learn several neural network paradigms and its applicationsK3
CO5: Analyze the different applications of these models to solve engineering and other problems. K4

MAPPING OF COs with POs and PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	M	M	S	S	M	S
CO2	S	S	M	S	M	M	M	M	S	S	S	M
CO3	S	S	S	S	M	M	S	M	S	S	S	S
CO4	S	S	S	S	S	S	M	M	S	M	S	S
CO5	S	S	M	S	S	S	S	M	S	M	S	M

S – Strongly Correlating - 3 Marks   **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21ITV42	**BIG DATA ANALYTICS LAB**	L	T	P	C
SEMESTER - IV			2	-	-	2
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				
Course Objectives		• To understand the Conceptualization and Summarization of big data • To understand Trivial data versus big data • To understand data computing technologies • The concepts of Machine learning techniques, and Scaling up machine learning approaches are used. • To understand Big data computing technologies using functions				

1. Installation of Hadoop:

    Three modes of Installation

    Stand Alone Mode:

    Pseudo Distributed Mode:

    Fully Distributed Mode

2. Weather Report POC-Map Reduce Program to analyse time – temperature statistics and generate report with max/min temperature.

Problem Statement:

1. The system receives temperatures of various cities (Austin, Boston, etc) of USA captured at regular intervals of time on each day in an input file.
2. System will process the input data file and generates a report with Maximum and Minimum temperatures of each day along with time.
3. Generate sa separate output report foreachcity.Ex:Austin-r-00000 Boston-r-00000 Newjersy-r-00000 Baltimore-r-00000 California-r-00000 Newyork-r-00000

3. Implementing Matrix Multiplication with Hadoop MapReduce

4. Pig Latin Scripts to sort, group, join, project, and filter our data.

5. Hive Databases, Tables, Views, Functions and Indexes

6. Hive Functions:

a. Built-in Functions

1. Collection Functions
2. Date Functions
3. Mathematical Functions
4. Conditional Functions
5. String Functions
6. Miscellaneous Functions

b. UDFs (User Defined Function)

Course outcomes:

CO1: Recall and identify the characteristics of datasets and compare the trivial data and big data for various applications K1

CO2: Apply to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration K3

CO3: Understand the problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues. K2

CO4: Understand and apply scaling up machine learning techniques and associated computing techniques and technologies.K2

CO5: Analyze and Design to recognize and implement various ways of selecting suitable model parameters for different machine learning techniques K3, K4

Mapping Of COs with POs and PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	M	M	M	S	S	M	S
CO2	S	S	M	S	M	M	M	M	S	S	S	M
CO3	S	S	S	S	M	M	S	M	S	M	S	S
CO4	S	S	S	S	M	S	M	M	S	M	S	S
CO5	S	S	M	S	S	S	S	M	S	M	S	M

S – Strongly Correlating - 3 Marks   M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

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