P.G. DEPARTMENT OF COMPUTER SCIENCE

Nallamuthu Gounder Mahalingam College

(Autonomous)

(An ISO 9001:2008 Certified Institution)

Re-Accredited with 'A' Grade by NAAC

Pollachi-642001

SYLLABUS

M. Sc. COMPUTER SCIENCE

BATCH 2019-2021

NGM COLLEGE

VISION

Our dream is to make the College an institution of excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong, spiritually evolved and culturally rich citizens to contribute to the holistic development of the self and society.

MISSION

Training students to become role models in academic arena by strengthening infrastructure, upgrading curriculum, developing faculty, augmenting extension services and imparting quality education through an enlightened management and committed faculty who ensure knowledge transfer, instill research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

PG DEPARTMENT OF COMPUTER SCIENCE

VISION

Exploring innovative approaches to enhance learning opportunities through the integration of technology and to develop more responsive strategies for adapting curriculum and changing demands in the Computing Profession.

MISSION

To provide strong theoretical foundation complemented with extensive practical training. Provide a learning ambience to enhance innovations, problem solving skills, leadership qualities, team spirit, ethical responsibilities

Scheme of Examination

Part	Subject Code	Title of the Paper	Duration in Hours per week	Examination					Page No.
				Hours	CIA	ESE	Total	Credits	
I SEMESTER									
III	19PCS101	Android Programming	5	3	25	75	100	4	1
	19PCS102	Analysis & Design of Algorithms	5	3	25	75	100	4	3
	19PCS103	Advanced Networks	5	3	25	75	100	4	5
	19PCS104	Data Mining and Warehousing	5	3	25	75	100	4	7
	19PCS105	Programming Lab - I: Android Programming	5	3	40	60	100	4	9
	19PCS106	Programming Lab –II: Analysis & Design of Algorithms	5	3	40	60	100	4	11
II SEMESTER									
III	19PCS207	Data Analytics using Python Programming	5	3	25	75	100	4	13
	19PCS208	Information Security and Cryptography	4	3	25	75	100	4	15
	19PCS209	Big Data Analytics	4	3	25	75	100	4	17
	19PCS210	Programming Lab -III : Data Analytics	4	3	40	60	100	4	19
	19PCS211	Programming Lab-IV : Scala Programming	4	3	40	60	100	4	21
	19PCS212	Programming Lab-V : Unified Modeling Language and R Tool	3	3	40	60	100	4	23
	19PCS2EX	Elective – I	5	3	25	75	100	5	26
IV	19PCS2N1/ 19PCS2N2	Non Major Elective: Multimedia Packages Lab /Web Designing Lab	1	3	-	100	100	2	32

Part	Subject Code	Title of the paper	Duration in Hrs per week	Examination					Page No.
				Hours	CIA	ESE	Total	Credits	
III SEMESTER									
III	19PCS313	Angular JS	4	3	25	75	100	4	35
	19PCS314	Digital Image Processing	5	3	25	75	100	4	37
	19PCS315	Internet of Things	5	3	25	75	100	4	39
	19PCS316	Programming Lab-VI : Angular JS	5	3	40	60	100	4	41
	19PCS317	Programming Lab-VII: Digital Image Processing using MATLAB	5	3	40	60	100	4	42
	19PCS3EX	Elective-II	5	3	25	75	100	5	45
IV SEMESTER									
III	19PCS418	Project Work and Viva voce (Individual)	-	-	-	200	200	10	52
TOTAL MARKS							**2200**	**90**	

ELECTIVE I

ELECTIVE II

Bloom's Taxonomy Based Assessment Pattern

K1-Remember; **K2**- Understanding; **K3**- Apply; **K4**-Analyze; **K5**- Evaluate

1. Theory: 75 Marks

(i)Test- I & II and ESE:

Knowledge Level	Section		Marks	Description	Total
K1 & K2	A(Answer all)	Q.1 to 5	10x1=10	MCQ	75
		Q.6 to 10		Define	
K3	B (Either or pattern)	Q.11 to 15	5x5=25	Short Answers	
K4 & K5	C (Answer 4 out of 6)	Q.16 is compulsory Q.17 to 21 (Answer 3 out of 5)	4x10=40	Descriptive/ Detailed	

2. Practical Examinations:

Knowledge Level	Section	Marks	Total
K3	Practical & Record work	60	100
K4		40	
K5			

Note:

1. Question paper pattern for Non-Major Elective(NME) Practical Paper (Maximum Marks: 100 Marks)

     Two questions from Computer Science Practical   -   80 marks

     Marks for Record   -   20 marks

Components of Continuous Assessment

Components		Calculation	CIA Total
Test 1	75	$\frac{75+75+25}{7}$	25
Test 2	75		
Assignment/Seminar	25		

Programme Outcomes

PO1. Develop core competence in computer science and prepare the students to take up a career in the IT industry as well as in research and development.

PO2. Ability to inculcate various thrust areas of computer science with sound knowledge of theory and hands-on practical skills.

Programme Specific Outcomes

PSO1: Ability to design, implement and evaluate a computer based systems, process, component or program to meet desired needs.

PSO2: Ability to analyze advantages and disadvantages of different computer science methods within professionally and academically complex areas to compete with new variants of acquired methods.

PSO3: Ability to employ in industry, government or entrepreneurial endeavors to demonstrate professional advancement through significant technical achievements and expanded leadership responsibilities.

PSO4: To provide foundation for research into the theory and practice of programming and design of computer based systems.

PSO5: To present knowledge, experience, reasoning methods and design and implementation techniques that are robust and forward looking.

SEMESTER I

Programme code:	M.Sc	**Programme Title :**	Master of Computer Science	
Course Code:	19PCS101	**Title**	**Batch :**	2019-2021
		Android Programming	**Semester**	I
Hrs/Week:	5		**Credits:**	4

Course Objective

On successful completion of the course, the students should have a good understanding on the Mobile Environment and acquired mobile application development skills with Android

Course Outcomes (CO)

K1	CO1	To keep in mind about the operation of the application, application lifecycle, configuration files, intents, and activities and layouts
K2	CO2	To get an idea of the UI - components, event handling, and screen orientation, various controls, fragments and examples.
K3	CO3	To deploy a basic application that acts as a working example with various concepts by using SQLite database
K4	CO4	To analyze the functions of various sensors.
K5	CO5	To evaluate the real time application development using android platform.

CONTENTS	Hours
UNIT I **Android:** Introduction – Android's Fundamental Components – Exploring the Structure of an Android Application – Examining the Application Life Cycle. **Introduction to Android Application Architecture:** Exploring a simple Android Application – Defining UI through Layout Files – Specifying Comments in Layout Files – Adding Views and View groups in Layout Files – Specifying Control Properties in Layout Files – Indicating View Group Properties – Controlling Width and Height of a Control – Introducing Resources and Backgrounds – Working with Text Controls in the Layout File – Working with Auto generated IDs for Controls – Loading the Layout File into an Activity – Gathering Controls – Placing the Files in the Android Project – Android Activity Life Cycle – Resources.	**13**
UNIT II **User Interface Development and Controls:** UI Development in Android - Building a UI Completely in Code - Building a UI Completely in XML - *Building a UI in XML with Code.* Android's Common Controls: Text Controls – Button Controls – The ImageView Control – Date and Time Controls – The MapView Control. Adapters and List Controls: SimpleCursorAdapter – ArrayAdapter – The Basic List Control ListView – The GridView Control – The Spinner Control – The Gallery Control – Styles and Themes – Layout Managers - Menus and Action Bars	**13**
Unit III **Fragments:**Introduction-Use of Fragments-The Structure of Fragment-Sample Program of Fragment .Broadcast Receivers-Coding a Simple Receiver-Registering a Receiver-Multiple Receivers. **SQLite:**Saving State using SQLite-SQLite Packages and Classes_Creating an SQLite Database-Migrating a Database-Inserting Rows-Deleting Rows- Reading Rows-Exploring Databases on the Emulator and available devices-Content Providers	**13**
UNIT IV **Touch Screens and Sensors:** Understanding Motion Events – The Motion Event Object –	**13**

Recycling Motion Events – Using Velocity Tracker – Multi-touch – Gestures. **Implementing Drag and Drop:** Exploring Drag and Drop – Basics of Drag and Drop in 3.0+ – *Drag-and-Drop* Example Application. **Sensors:** Introduction – Detecting Sensors – Getting Sensor Events – Interpreting Sensor Data.	
UNIT V **Application Security and Deployment:** Security and Permissions – Understanding the Android Security Model – Performing Runtime Security Checks – Deploying the Application: Becoming a Publisher – Preparing the Application for Sale – Uploading the Application.	**13**
Total Hours	**65**

Italicized texts are for self study

Power point Presentations, Seminar , Assignment, Activity, Case study

Text Books
1. Dave MacLean, Satya Komatineni, Grant Allen, 2015, "Pro Android 5", Apress Publications.
2. Wei-Meng-Lee, 2012, "Beginning Android Tablet Application Development", Wiley Publications

Reference Books
1. Barry Burd, 2016, "Android Application Development – All-in-one for Dummies", 2nd Edition, Wiley India.
2. Lauren Darcey, Shane Conder, 2013, "Sams Teach Yourself Android Application Development in 24 hours", 2nd edition, Pearson Education.
3. Paul Deitel, Harvey Deitel, Alexander Wald, 2016, "Android 6 for Programmers – An App-driven Approach", 3rd edition, Pearson education.
4. Jerome (J. F) DiMarzio, 2015, "Android – A Programmer's Guide", McGraw Hill Education, 8th reprint.

MAPPING

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	S
CO2	M	M	H	S	H
CO3	M	H	S	S	M
CO4	M	H	M	M	H
CO5	S	H	M	M	H

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: S.Vallinayagam	Name: Dr.M. Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	Programme Title :		Master of Computer Science
Course Code:	19PCS102	Title	Batch :	2019-2021
		Analysis & Design of	Semester	I
Hrs/Week:	5	Algorithms	Credits:	4

Course Objective

On successful completion of the course the students should understand the various design and analysis of various data structure algorithms.

Course Outcomes (CO)

K1	CO1	To remember worst case running times of algorithms using asymptotic analysis
K2	CO2	To understand divide-and-conquer paradigm, dynamic-programming paradigm, greedy paradigm and branch and bound strategies and apply them for the appropriate problems
K3	CO3	To deploy different data structures
K4	CO4	To analyze major graph algorithms and to employ graphs to model engineering problems
K5	CO5	To validate divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm

CONTENTS	Hours
UNIT I **Introduction:** algorithm definition and specification – performance analysis –Elementary Data structures:- *stacks and queues – trees* – dictionaries – priority queues – sets and disjoint set union – graphs – Basic traversal and search techniques – Techniques for Binary Tree – Techniques for Graphs: Breadth First Search and Traversal, Depth First Search and Traversal.	**13**
UNIT II **Divide – and – conquer:** - General method – binary search – merge sort – quick sort –The Greedy method: - General method – knapsack problem – minimum cost spanning tree – single source shortest path.	**13**
UNIT III **Dynamic Programming:** General method – multistage graphs – all pair shortest path – optimal binary search trees – 0/1 Knapsack – *traveling salesman problem* – flow shop scheduling.	**13**
UNIT IV **Backtracking:** General method – 8-Queens problem – sum of subsets – graph coloring – Hamiltonian cycles – knapsack problem.	**13**

UNIT V	
Branch and bound: The method – Least Cost (LC) Search – The 15 puzzle: An Example – Control abstractions for LC Search – Bounding – FIFO Branch and Bound – LC Branch and Bound – 0/1 Knapsack problem – LC Branch and Bound solution – FIFO Branch and Bound solution – Traveling salesperson.	**13**
Total Hours	**65**

Italicized texts are for self study

> Power point Presentations, Seminar , Assignment, Brain storming

Text Books

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2008, "Computer Algorithms", 2nd Edition, Galgotia Publications

Reference Books

1. Ellis Horrowitz, Sartaj Sahni, 2015, "Fundamentals of data structures", Reprinted Edition, Galgotia
   Publications
2. Alfred V.Aho, John E.Hopcroft & Jeffery D Ullman, 2009 , "Data structures and Algorithms", Reprinted
   Edition, PHI learning pvt Ltd
3. Adam Drozdek, 2012, "Data Structures and Algorithms in C++", 4th Edition, Vikas publishing house, NewDelhi

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	H	H
CO2	H	M	M	S	S
CO3	S	H	S	M	M
CO4	M	S	M	H	M
CO5	M	S	H	S	M

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: S.Sharmila	Name: Dr.M. Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS103	Title	Batch :	2019-2021
		Advanced Networks	Semester	I
Hrs/Week:	5		Credits:	4

Course Objective

On successful completion of the course the students should gain in-depth knowledge of Internet protocols and their functionalities.

Course Outcomes (CO)

K1	CO1	To recollect OSI and TCP/IP layers and their tasks. Interpret and explain physical, logical and port addresses
K2	CO2	To comprehend Standard Ethernet and Mapping techniques
K3	CO3	To deploy Logical addressing and discuss the format of Ipv4 and Ipv6 addresses
K4	CO4	To analyze the problems and solutions associated with delivery and forwarding of packets
K5	CO5	To present knowledge on Mobile IP, Client-Server interactions

CONTENTS	Hours
UNIT I **Introduction and overview - Network Technologies:** Two Approaches To network Communication-Wide Area And Local Area Networks-Ethernet Technology-Switched Ethernet-Asynchronous Transfer Mode. Internetworking Concept and Architectural Model-**Classful Internet Addresses:** Introduction – Universal Identifiers – Original Classful Addressing scheme – Address Specify Network Connections – Broadcast Address – All 0's Address – Subnet, Multicast, Weakness in Internet Addressing – Dotted Decimal Notation, Loopback Addresses. **Mapping Internet Addresses To Physical Addresses(ARP):** The Address Resolution Problem-Two Types Of Physical Addresses-Resolution Through Direct Mapping-Resolution Through Dynamic Binding-The Address Resolution Cache-ARP Cache Timeout-ARP Refinements-Relationship Of ARP To Other Protocols-ARP Implementation-ARP Encapsulation And Identification-ARP Protocol Format-Automatic ARP Cache Revalidation-Reverse Address Resolution(RARP).	**13**
UNIT II **Internet Protocol: Connectionless Datagram Delivery (IPv4):** A Virtual Network-Internet Architecture and Philosophy-The Conceptual Service Organization-Connectionless Delivery System-Purpose of the Internet Protocol-The IPv4 Datagram-Internet Datagram Options. **Forwarding IP Datagrams:** Forwarding In An Internet-Direct And Indirect Delivery-Table-Driven IP Forwarding-Next-Hop Forwarding- The IP Forwarding Algorithm-Forwarding With IP Addresses-Internet Protocol. **Error And Control Messages(ICMP):** The Internet Control Message Protocol-Error Reporting Vs. Error Correction-ICMP Message Delivery-ICMP Message Format-Testing Destination Reachability And Status(ping)-Echo Request And Reply Message Format-Reports Of Unreachable Destinations-Congestion And Datagram Flow Control-Source Quench Format.	**13**
UNIT III **Classless And Subnet Address Extensions (CIDR):** Review Of Relevant Facts-Minimizing Network Numbers-Proxy ARP-Subnet Addressing-Flexibility In Subnet Address Assignment -The Subnet Forwarding Algorithm-A Unified Forwarding Algorithm. **Protocol Layering:** Introduction –Needs-Conceptual Layer_ Functionality- X.25 and ISO Model-Locus of intelligence-Principle-Network substructure-TCP/IP Model-Disadvantage-Idea behind Multiplexing and Demultiplexing.	**13**

User Datagram Protocol (UDP): Identifying The Ultimate Destination-The User Datagram Protocol-Format Of UDP Messages-UDP Pseudo-Header-UDP Encapsulation And Protocol Layering-Layering And The UDP Checksum Computation-UDP Multiplexing, Demultilplexing , And Ports-Reserved And Available UDP Port Numbers.	
UNIT IV **Routing Between Peers (BGP):** BGP Characteristics-BGP Functionality And Message Types-BGP Message Header-BGP OPEN Message-BGP UPDATE Message-Compressed Mask-Address pairs-BGP path Attributes-BGP KEEPALIVE Message-The Internet Routing Architecture-BGP NOTIFICATION Message. **Mobile IP:** Mobility, Routing, and Addressing-Mobile IP Characteristics- The Two-Crossing Problem-Communication with Computers on the Home Network. **Client-Server Model of Interaction:** Model-UDP Echo Server-Time and Date Service-The Complexity of Servers. **Bootstrap and Auto-configuration (DHCP):** IP address-Retransmission-Message format-Address Acquisition States.	13
UNIT V **Remote Login And Desktop (TELNET, SSH):** Remote Interactive Computing-TELNET Protocol-Accommodating Heterogeneity-Passing Commands That Control The Remote Side-Forcing The Server To Read A Control Function-TELNET Options-TELNET Option Negotiation-Secure Shell (SSH)-Other Remote Access Technologies. File Transfer and Access (FTP, TFTP, NFS)-*Electronic mail* (SMTP, POP, IMAP, MIME)-*World Wide Web* (HTTP)- A Next Generation IP (IPv6).	13
Total Hours	**65**
Italicized texts are for self study	
Power point Presentations, Seminar ,Assignment, Experience Discussion, Brain storming	
Text Book 1. Douglas E. Comer, 2015, "Internetworking with TCP/IP Volume I", Prentice Hall.	
Reference Books 1. Douglas E. Comer, David L.Stevens, 2010, "Internetworking with TCP/IP Volume II", Prentice Hall. 2. Uyless Black, 2005, "TCP/IP & Related Protocols", Tata McGraw-Hill. 3. Menezes.A, Van Oorschot.P and Vanstone. S, 2011,"Hand Book of Applied Cryptography",CRC Press.	

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	S
CO2	S	M	S	S	H
CO3	M	S	S	H	M
CO4	M	H	H	M	H
CO5	M	M	H	M	M

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: R. Nandha Kumar Signature:	Name: Dr.M. Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS104	Title	Batch :	2019-2021
		Data Mining and Warehousing	Semester	I
Hrs/Week:	5		Credits:	4

Course Objective

On successful completion of the course the students should understand the concept of data mining, classification and clustering techniques, Association rules and data warehousing.

Course Outcomes (CO)

K1	CO1	To remember the basic concepts of Data Mining and Data Warehouse Techniques
K2	CO2	To get the idea of raw data to make it suitable for various data mining algorithms
K3	CO3	To execute and measure interesting patterns from different kinds of databases
K4	CO4	To analyze the techniques of clustering, classification, association finding, feature selection and visualization to real world data
K5	CO5	To evaluate the performance of different data-mining algorithms

CONTENTS	Hours
UNIT I **Introduction:** Basic data mining tasks - *Data Mining versus Knowledge discovery in databases* – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective. **Data mining techniques:** Introduction – a statistical perspective on data mining–similarity measures–decision trees–neural networks–genetic algorithms.	13
UNIT II **Classification:** Introduction – Statistical – based algorithms - distance – based algorithms – decision tree - based algorithms - neural network – based algorithms –rule – based algorithms – combining techniques	13
UNIT III **Clustering:** Introduction – Similarity and distance measures – Outliers. **Hierarchical algorithms:** Agglomerative algorithms – Divisive clustering. **Partitioned algorithms:** Minimum Spanning tree – Squared error clustering algorithm – K – means clustering – Nearest neighbor algorithm – PAM algorithm – Bond energy algorithm – Clustering with genetic algorithm – Clustering with neural networks.	13
UNIT IV **Association rules:** Introduction - large item sets. **Basic algorithms:** Apriori algorithm – Sampling algorithm – Partitioning. **Parallel & distributed algorithms:** Data parallelism – Task parallelism. Comparing approaches, Incremental rules. **Advanced association rules techniques:** Generalized association rules – Multiple level association rules – Quantitative association rules – Using multiple minimum supports – Correlation rules. Measuring the quality of rules.	13
UNIT V **Data Warehousing:** Introduction - characteristics of a data warehouse – data marts – other	13

aspects of data mart. **Online analytical processing:** Introduction - OLTP & OLAP systems– data modeling – star schema for multidimensional view – data modeling – multifact star schema or snow flake schema–OLAPTOOLS–State of the market – OLAP TOOLS and the internet. **Developing a Data Warehouse:** why and how to build a data warehouse –data warehouse architectural strategies and organization issues - design consideration – data content – metadata - distribution of data – tools for data warehousing – performance considerations –crucial decisions in designing a data warehouse. *Applications of data warehousing and data mining in government*

Total Hours	65

Italicized texts are for self study

Power point Presentations, Seminar , Assignment, Case study

Text Books
1. Margaret H. Dunham, 2008, "Data Mining introductory and advanced topics", 3rd Edition, Pearson Education.
2. Prabhu C.S.R, 2000, "Data Warehousing concepts, techniques, products and a applications", 3rd Edition, PHI.

Reference Books
1. Jiawei Han & Micheline Kamber, 2006, "Data Mining Concepts & Techniques", 2nd Edition, Academic Press.
2. Arun K.Pujari, 2003, "Data Mining Techniques", Revised Edition, Universities Press (India) Pvt.Ltd.

MAPPING

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	H	S
CO2	H	M	H	S	H
CO3	S	H	M	M	M
CO4	M	H	H	S	S
CO5	M	H	S	S	L

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: N.Yasodha	Name: Dr.M. Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS105	Title	Batch :	2019-2021
		Programming Lab-I:	Semester	I
Hrs/Week:	5	Android Programming	Credits:	4

Course Objective

On successful completion of the course the students should be equipped with skills for analyzing, designing, developing and troubleshooting android applications.

Course Outcomes (CO)

K3	CO1	To execute Java programming language to build Android applications and use development tools in the Android development environment.
K4	CO2	To figure out UI-rich applications using all the major UI components like Fragments and the Action Bar, Layouts, various controls.
K5	CO3	To access and manipulate data using Content Providers, Shared Preferences and Notifications with SQLite database.

1. Create a simple program to display a "HelloWorld" on screen
2. Create an application using Text Controls
3. Create an application using Button Controls
4. Create an application using AutocompleteTextView Control
5. Create an application using MultiAutocompleteTextView Control
6. Create an application using RadioButton, Control
7. Create an application using ImageView Control
8. Develop an application using Date Control
9. Create an application using Time Control
10. Create a program using TextClock and Analog Controls
11. Create a program using ListView Controls
12. Create a program using Spinner Controls
13. Create a program using Gallery Controls
14. Create a program using GridView Controls
15. Create a program using MapView Controls
16. Create an android application using styles and themes.
17. Create a program using GridView Controls
18. Create an application using different types of layout managers.
19. Develop an application using Menus and Actionbars
20. Create an application using Fragements
21. Create an application using Fragements
22. Develop an application using Broadcast Receivers
23. Develop an application using SQLite Database
24. Create an application to implement Drag and Drop concept
25. Develop an application using single touch and multi touch
26. Develop an application to display the various sensors available in an android device
27. Develop an application to measure and display gravity from accelerometers

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	H
CO2	M	M	S	S	H
CO3	M	S	H	M	M

S: Strong H: High M: Medium L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: S.Vallinayagam	Name: Dr.M.Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS106	Title	Batch :	2019-2021
		Programming Lab-II:	Semester	I
Hrs/Week:	5	Analysis & Design of Algorithms	Credits:	4

Course Objective

On successful completion of the course the students should understand the concepts of various data structures.

Course Outcomes (CO)

K3	CO1	To implement appropriate data structure for given contextual problem
K4	CO2	To analyze complexities of various data structure algorithms
K5	CO3	To prove appropriate data structure is applied to specified problem definition

Program to implement the concept for

1. Permutation Generator
2. Towers of Hanoi
3. Circular Queue
4. Stack using Linked list
5. Doubly linked list
6. Tree traversal(inorder, preorder, postorder)
7. Graph traversal Using Depth first search
8. Graph traversal Using Breadth first search
9. Binary search
10. Merge sort using divide and conquer
11. Quick sort
12. Insertion of element into heap
13. Implementation of 8-Queens problem
14. Traveling sales man problem
15. Knapsack using Greedy Method
16. Minimum Cost Spanning tree
17. Optimal Binary Search
18. 0/1 Knapsack problem using dynamic programming
19. All pairs shortest path
20. Flow shop scheduling.
21. Knapsack problem using backtracking

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	S	M	H	S	H
CO3	S	H	S	M	S

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: S.Sharmila	Name: Dr.M.Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

SEMESTER II

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS207	Title	Batch :	2019-2021
		Data Analytics using Python	Semester	II
Hrs/Week:	5	Programming	Credits:	4

Course Objective

On successful completion of this course the students should understand the core principles of the Python Language and use the tools to produce well designed programs in python and create effective GUI applications.

Course Outcomes (CO)

K1	CO1	To remember the principles of structured programming Recognize and construct common programming idioms: variables, loop, branch, subroutine, and input/output.
K2	CO2	To understand the common programming idioms: variables, loop, branch, subroutine, and input/output
K3	CO3	To deploy the concepts of lists, tuples, dictionaries, standard libraries, modular programming and the design of user interfaces
K4	CO4	To figure out ability to analyze and solve the problems using advanced facilities of the Python language
K5	CO5	To evaluate and apply the functions and python libraries to analyze and solve various data analytics problems

CONTENTS	Hours
UNIT I **Introduction to Python:** Introduction – Python overview – Getting started – Comments – Python identifiers – Reserved keywords – Variables – Standard data types – Operators – Statements and Expressions – String operations – Boolean expressions. **Classes and Objects:** Overview of OOP – Data encapsulation – Polymorphism – Class definition – Creating objects – *Inheritance* – Multiple inheritances – Method overriding – Data encapsulation – Data hiding.	**10**
UNIT II **Control Statements and Functions:** *Control Statements:* The for loop – While statement – if elif else statement – Input from keyboard. Functions: Introduction – Built-in functions – Type conversion – Type coercion – Date and time – dir() function – help() function – User defined functions – Parameters & arguments – Function calls – The return statement – Python recursive function. **Strings and Lists:** Strings – Compound data type – len function – String slices – String traversal – Escape characters – String formatting operator – String formatting functions. Lists – Values and accessing elements – Traversing a list – Deleting elements from list – Built-in list operators – Built-in list methods.	**10**
UNIT III **Tuples and Dictionaries:** Tuples – Creating tuples – Accessing values in tuples – Tuple assignment – Tuples as return values – Basic tuple operations – Built-in tuple functions Dictionaries – Creating dictionary – Accessing values in dictionary – Updating dictionary – Deleting elements from dictionary – Operations in dictionary Built-in dictionary methods.	**10**

Files and Exceptions: Introduction to File Input and Output-Using loops to process files-Processing |Records-Exception.	
UNIT IV **GUI Programming:** Graphical user Interface, Using the tkinter Module, Display text with Label Widgets-Organizing Widget with Frames-Button Widgets and Info Dialog Boxes, Getting Input with Entry Widget using Label as Output Fields, Radio button, Check buttons. Numpy: Arrays Array indexing data types Array math Broad casting	**11**
UNIT V **Pandas:** Environmental setup- Introduction to Data structures –Series- DataFrame –Panes- Basic Functionality- Function Application. **Ipython:** Running and editing Python Script – History Commands- System Commands- Command Line Options-Importing Python Shell code – Magic commands.	**11**
Total Hours	**52**
* *Italicized* texts are for self study	
Power point Presentations, Group discussions, Seminar , Assignment	
Text Books 1. E Balagurusamy, 2016, "Introduction to computing and problem solving using python", McGrawHill publication. 2. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython by Wes McKinny, O'Reilly Media, 2012. ISBN 978-1-4493-1979-3	
Reference Book 1. Mark Lutz, 2013,"Learning Python", 5th Edition. 2. Welsey J. Chun, 2001, "Core Python Programming", Prentice Hall.	

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	H	M
CO2	H	M	H	S	H
CO3	M	S	L	M	S
CO4	S	H	H	M	H
CO5	S	M	H	H	H

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: Dr. R. Deepa	Name: Dr.M. Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS208	Title	Batch :	2019-2021
		Information Security and	Semester	II
Hrs/Week:	4	Cryptography	Credits:	4

Course Objective

On successful completion of the course students will be able to understand the possible threats, vulnerabilities and attacks on computer systems and also to apply the necessary approaches and techniques to develop protection mechanism against them.

Course Outcomes (CO)

K1	CO1	To remember the basics of information security and cryptography
K2	CO2	To understand the possible attacks on browsers and various methods to protect them.
K3	CO3	To apply the security in operating system and cloud applications
K4	CO4	To analyze differential and linear cryptanalysis in symmetric cryptography
K5	CO5	To evaluate various algorithms in public key cryptography

CONTENTS	Hours
UNIT I **Introduction:** Threats- vulnerabilities- controls- Confidentiality- integrity- availability- Attackers and attack types. Authentication- Identification Versus Authentication- Authentication Based on biometrics- Authentication Based on Tokens- Federated Identity management- Multifactor Authentication- Secure Authentication. Implementing Access Control- Procedure-Oriented Access Control- *Role Based Access Control*.	**10**
UNIT II **Browser Attacks:** Browser Attack Types- How Browser Attacks Succeed: Failed Identification and Authentication- Web Attacks Targeting Users False or Misleading Content- Malicious Web Content- Protecting Against Malicious Web Pages- Foiling Data Attacks- Email Attacks- Phishing-Protecting Against Email Attacks.	**10**
UNIT III **Security in Operating System and Cloud:** **Operating System Security:** Security in Operating Systems- Security in the Design of Operating Systems- Rootkit. **Cloud Security:** Cloud Computing Concepts- Service Models- Deployment Models- Moving to the Cloud- Risk Analysis Cloud Provider Assessment- Switching Cloud Providers- Cloud Security Tools and Techniques Data Protection in the Cloud- Cloud Application Security- Cloud Identity Management.	**10**
UNIT IV **Symmetric Cryptography:** Divisibility and the Division Algorithm- Euclid"s algorithm Modular arithmetic - Congruence and matrices - Groups, Rings, Fields- Finite fields- Symmetric Key Ciphers: DES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 –Key distribution.	**10**

UNIT V **Public Key Cryptography** Primes – *Primality Testing* –Factorization – Euler's totient function, Fermat's and Euler's Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - Asymmetric Key Ciphers: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.	10
Total Contact Hrs	**50**

Italicized texts are for self study
Power point Presentations, Seminar , Assignment

Text Books
1. Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies, "Security in Computing", 2015, 5th Edition, Pearson Publications (Unit-I,II & III).
2. William Stalling, "Cryptography and Network Security Principles and Practice",2011, 5th Edition, Pearson Publications (Unit-IV & V)

Reference Books
1. Taylor Sutton Finch Alexander, Information Security Management Principles, 2012, 2nd edition BCS Learning and development Limited, United Kingdom.
2. Behrouz A Fououzan, "Cryptograhy & Network Security", 2007, Tata McGraw Hill.
3. Josef Pieprzyk, Thomas Hardjono and Jennifer Sebery, "Fundamentals of Computer Security", 2002, Springer.

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	S
CO2	S	M	H	S	L
CO3	H	H	S	M	M
CO4	M	S	H	H	H
CO5	S	M	S	H	L

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	CDC	COE
Name: N. Arul kumar Signature:	Name: Dr.M.Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS209	Title	Batch :	2019-2021
		Big Data Analytics	Semester	II
Hrs/Week:	4		Credits:	4

Course Objective

On successful completion of this course students will possess the skills necessary for utilizing tools (including deploying them on Hadoop/MapReduce) to handle a variety of big data analytics, and able to apply R- tool for statistical analysis.

Course Outcomes (CO)

K1	CO1	To remember how to collect, manage, store, query, and analyze various forms of big data and data types of R.
K2	CO2	To understand the concept and challenge of big data and why existing technology is inadequate to analyze the big data
K3	CO3	To apply R programming for statistics and data analysis.
K4	CO4	To analyze un-modeled, multi-structured data using Hadoop, MapReduce and how R Programming has made modifications in Big Data.
K5	C05	To build the novel architectures and platforms introduced for Big data, in particular Hadoop and MapReduce.

CONTENTS	Hours
UNIT I **Fundamentals of Big Data:** Evolution of Data Management-*Managing the data* – Big Data – Big data management architecture. **Big Data Types**: Structured data – Unstructured Data –Real Time and Non- real time requirements – Big Data together. **Distributed Computing:** History of Distributed Computing – Basics of Distributing Computing – Performance.	**10**
UNIT II **Big Data Technology Components**: Big Data Stack – Redundant Physical Infrastructure – Security Infrastructure – Operational Databases – Organizing Data Services and Tools – Analytical Data Warehouses – Big Data Analytics – Big Data Applications. **Virtualization:** Basics of Virtualization – Managing virtualization with Hypervisor – Abstraction and Virtualization – Implementing Virtualization. **Cloud and Big Data:** Cloud in the context of Big Data – Cloud Deployment and Delivery models – Cloud as an imperative for big data – Use of cloud for Big data – Providers in the Big Data Cloud Market.	**10**
UNIT III **Operational Database:** Relational, Non-relational, Key-value Pair, Document, Columnar, Graph, Spatial, Polygot Persistence. **Map Reduce Fundamentals**: Origin of Map Reduce- Map Function – Reduce Function – Putting Map and Reduce together – *Optimizing Map*-Reduce Tasks. **Exploring the world of Hadoop**: Hadoop – Hadoop Distributed File System – Hadoop map Reduce.**Hadoop Foundation and Ecosystem**: Building Big Data Foundations with Hadoop Ecosystems – Managing Resources and Applications with Hadoop YARN – Storing Big Data with HBase – Mining Big Data with Hive – Interacting with Hadoop	**10**

Ecosystem	
UNIT IV **Introducing R**: The Big Picture – Exploring R – The Fundamentals of R – **Work with R** - Getting Started with Arithmetic – Getting Started with Reading and Writing – Working with Dimensions.	**10**
UNIT V **Coding in R** – Putting fun in functions – Controlling the logic flow – Debugging Your Code – Getting Data into and out of R – Manipulating and Processing Data – **Working with Graphics** – Using Base Graphics.	**10**
Total Hours	**50**

Italicized texts are for self study

Power point Presentations, Seminar , Assignment

Text Book

1. Judith Hurwitz, Alan Nurgent, Dr. Fern Halper, Marcia Kaufman, 2013, "Big Data for Dummies", 1st Edition, A Wiley Publication.
2. Andrie De Vries, Joris Meys, 2015, "R for Dummies", 2nd Edition, John Wiley & Sons.

Reference Books

1. Michael Minelli, Michele Chambers, Ambiga Dhiraj, 2013, "Big Data, Big Analytics – Emerging Business Intelligence and Analytic Trends For Today's Businesses", First Edition, A Wiley Publication.
2. Strata Conference, Making Data Work, 2013, "Big Data Now", First Edition, Shroff Publication.
3. Kun Ren, 2016, "Learning R Programming", First Edition, Packt Publication.

MAPPING

PSO CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	H	H	S
CO2	M	H	H	M	S
CO3	H	M	H	H	M
CO4	M	H	H	M	H
CO5	L	M	H	H	S

S: Strong   H: High   M: Medium   L: Low

Course Designed by	**Verified by HOD**	**Checked by**	**Approved by**
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name:M.Dhavapriya Signature:	Name: Dr.M.Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS210	Title	Batch :	2019-2021
		Programming Lab-III : Data Analytics	Semester	II
Hrs/Week:	4		Credits:	4

Course Objective

On successful completion of the course the students should write well-documented programs in the Python language, including use of the logical constructs of that language.

Course Outcomes (CO)

K3	CO1	To implement, Interpret, Contrast of various operators.
K4	CO2	To review and analyze database with variables, loop, branch, subroutine, and input/output
K5	CO3	To validate how databases are integrated with components ,modular programming and the design of user interfaces

1. Write a program that displays the following information: Your name, Full address, Mobile number, College name, Course subjects.

2. Write a program to find the largest three integers using if-else and conditional operator.

3. Write a program that asks the user to enter a series of positive numbers (The user should enter a negative number to signal the end of the series)and the program should display the numbers in order and their sum.

4. Write a program to find the product of two matrices [A]mxp and [B]pxr

5. Write recursive and non-recursive functions for the following:

    a. To find GCD of two integers.

    b. To find the factorial of positive integer

    c. To print Fibonacci Sequence up to given number n

6. Write a program to display two random numbers that are to be added, such as: 247 + 129, the program should allow the student to enter the answer. If the answer is correct, a message of congratulations should be displayed. If the answer is incorrect, a message showing the correct answer should be displayed.

7. Write recursive and non-recursive functions to display prime number from 2 to n.

8. Write a program that writes a series of random numbers to a file from 1 to n and display.

9. Write a program to create file, write the content and display the contents of the file with each line preceded with a line number (start with 1) followed by a colon.

10. In a program, write a function that accepts two arguments: a list and a number n. The function displays all of the numbers in the list that are greater than the number n.

11. Write a program with a function that accepts a string as an argument and returns the no. of vowels that the string contains. Another function to return number of consonants.

12. Write a program that opens a specified text file and then displays a list of all the unique words found in the file. (Store each word as an element of a set.)

13. Write a program to analyze the contents of two text files using set operations.

14. Write a program to implement the inheritance and dynamic polymorphism.

15. Write a GUI program that converts Celsius temperatures to Fahrenheit temperatures.

16. Write a GUI program that displays your details when a button is clicked.

17. Write a python program to do stack operations using numpy.

18. Write a python program to transpose a matrix.

19. Write a python program for slicing a matrix.

20. Merge two datasets using pandas

21. Write a pandas program to cluster data in python.

Power point Presentations, Experience Discussion, Brain storming

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MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	S
CO2	H	M	M	S	H
CO3	M	S	H	M	M

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name:Dr. R. Deepa	Name: Dr.M. Sakthi	Name: Dr. M. Durairaju	Name: Dr. R.Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS211	Title	Batch :	2019-2021
		Programming Lab-IV: Scala Programming	Semester	II
Hrs/Week:	4		Credits:	4

Course Objective

On successful completion of the course the students should understand the concepts of Client/Server, TCP, and UDP.

Course Outcomes (CO)

K3	CO1	To implement mathematical operations using Scala .
K4	CO2	To review and analyze database with variables, loop, branch, subroutine, and input/output
K5	CO3	To validate how databases are manipulated with components ,modular programming using Scala

1. Write a Scala program to print your name.
2. Write a Scala program to find largest number among two numbers.
3. Write a Scala program to find a number is negative or positive.
4. Write a Scala program to declare string variable and print the string.
5. Write a Scala program to demonstrate example of multiple variables declarations and assignments.
6. Write a Scala program to print numbers from 1 to 100 using for loop.
7. Write a Scala program to print numbers from 1 to 100 using for loop with until to determine loop range.
8. Write a Scala program to demonstrate example of collection list and for loop.
9. Write a Scala program to create a user define function to return largest number among two numbers.
10. Write a Scala program of array - Declare, print and calculate sum of all elements.
11. Write a Scala Program for Finding subarray with given sum
12. Write a Scala Program to find the Toppers of Class
13. Write a Scala Program to find Shortest Source to Destination Path
14. Write a Scala Program to Print Boundary Sum of a Binary Tree

Power point Presentations, Assignment, Experience Discussion, Brain storming

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	H	H
CO2	H	M	H	S	H
CO3	M	S	H	M	M

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name:Dr.R.Deepa Signature:	Name: Dr.M.Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS212	Title	Batch :	2019-2021
		Programming Lab-V:	Semester	II
Hrs/Week:	3	Unified Modeling Language and R- Tool	Credits:	4

Course Objective

On successful completion of the course the students should understand the concepts of UML Diagrams for various applications and R Programming for statistical data analysis.

Course Outcomes (CO)

K3	CO1	To implement potential benefits of object-oriented programming over other approaches
K4	CO2	To interpret object-oriented approach for developing applications of varying complexities
K5	CO3	To verify how a system interacts with its environment using R-Tool

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Create a UML diagrams for the following applications.
1. Single sign-on to Google Application
2. ATM Processing System
3. Quiz system
4. Student information system
5. Tourism and travel management system
6. Online shopping Domain
7. Construction management system
8. Library domain model
9. Inventory management system

Note: The applications are developed using Class, Object, Use case, Sequence, Activity, Collaboration, Deployment, Component diagrams.

R Tool
1. Calculate Mean, Standard Deviation and Histogram by reading data from a file.
2. Simple Vector and Matrix calculations using R.
3. Create functions with Looping using R.
4. Create a simple data frame from 3 vectors. Order the entire data frame by the first column.
5. Draw a scatterplots for a dataset using R.

MAPPING

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	M	H	S	H
CO3	S	L	M	M	M

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name:M.Dhavapriya	Name: Dr.M.Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

ELECTIVE – I

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS2E1	Title	Batch :	2019-2021
		ELECTIVE- I:	Semester	II
Hrs/Week:	5	Computing Technologies	Credits:	5

Course Objective

On successful completion of the course the students should understand the concepts of cloud computing, developing cloud services, Centralizing Email communications, cloud computing services and grid computing.

Course Outcomes (CO)

K1	CO1	To understand the architecture and concept of different Cloud models-SaaS,PaaS,Web Services and On-Demand Computing
K2	CO2	To provide a strong fundamental concepts in the underlying principle of cloud virtualization , cloud storage, data management and data visualization
K3	CO3	To implement various applications by utilizing cloud platforms such as Google AppEngine and Amazan's web services(AWS)
K4	CO4	To analyze various Grid computing technologies such as OGSA and OGSI
K5	CO5	To Create application by utilizing cloud platforms such as Google app Engine and Amazon Web Services

CONTENTS	Hours
UNIT I **Fundamentals of grid and cloud computing:** Introduction to Grid computing- Merging the Grid Services Architecture with the Web Services Architecture. Introduction to Cloud computing – History of Cloud Computing –How Cloud Computing works-Companies in the Cloud Computing Today	**13**
UNIT II **Developing cloud services:** Computing in the Cloud - The Pros and Cons of Cloud Computing-Benefits of Cloud Computing. Developing Cloud Services: Web Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2- Google App Engine – IBM Clouds.	**13**
UNIT III **Cloud computing for everyone**: *Centralizing Email communications* – collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation	**13**
UNIT IV **Using cloud services:** Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Databases – Storing and Sharing Files – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis	**13**

UNIT V	**13**
Grid computing: Open Grid Services Architecture (OGSA) – Sample Use Cases that drive the OGSA – The OGSA Platform Components – Open Grid Services Infrastructure (OGSI) – OGSA Basic Services	

Total Hours	**65**

Italicized texts are for self study

Power point Presentations, Group discussions, Seminar ,Quiz, Assignment, Experience Discussion, Brain storming, Activity

Text Books

1. Joshy Joseph & Criag Fellenstein, 2009, "Grid Computing", PHI, PTR.
2. Michael Miller, August 2009 , "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing.

Reference Books

1.Jose C.Cunha, Omer F.Rana (Eds), 2006, "Grid Computing", Springer International Edition.
2.Anthony T. Velte and others, 2011 , "Cloud Computing" TATA Mc-Graw Hill Publications, New Delhi.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S
CO2	H	M	H	S	H
CO3	M	H	S	M	M
CO4	M	H	H	M	H
CO5	H	M	L	H	M

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: Dr.A.Kanagaraj	Name: Dr.M. Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS3E2	Title	Batch :	2019-2021
		ELECTIVE – I : Soft	Semester	II
Hrs/Week:	5	Computing	Credits:	5

Course Objective

On successful completion of the course the students should understand the concepts of Neural Networks, architecture, functions and various algorithms involved and also know the fundaments of fuzzy logic, various fuzzy systems and their functions.

Course Outcomes (CO)

K1	CO1	To remember soft computing techniques and their applications.
K2	CO2	To understand perceptrons and counter propagation networks and fuzzy systems.
K3	CO3	To apply soft computing techniques to solve real life problems.
K4	CO4	To analyze various neural network architectures.
K5	CO5	To evaluate Fuzzy Logic, Various fuzzy systems and their functions.

CONTENTS	Hours
UNIT I Fundamentals of Neural Networks: Basic concepts of Neural Networks –Human Brain – Model of an Artificial Neuron – Neural Network Architectures – Characteristics of Neural Networks – Learning methods - Easy Neural Network Architectures – Some Application domains.	**13**
UNIT II Back propagation Networks: *Architecture of a Back-Propagation Network* – Back propagation Learning- Effect of Tuning parameters of the Back Propagation Neural Network – Selection of various parameters in BPN.	**13**
UNIT III Adaptive Resonance Theory: Introduction: Cluster Structure, Vector Quantization, Classical ART Networks, Simplified ART Architecture. ART1: Architecture of ART1–Special features of ART1 Models-ART1 Algorithms. ART2: Architecture of ART2– ART2 Algorithms.	**13**
UNIT IV Fuzzy Set Theory: Fuzzy versus crisp, Crisp sets: Operation on Crisp sets- Properties of Crisp Sets-Partition and Covering. Fuzzy sets: Membership Function – Basic fuzzy set Operations-properties of fuzzy sets. Crisp relations: *Cartesian product*-Other Crisp Relations-Operations on Relations. Fuzzy relations: Fuzzy Cartesian product- Operations on Fuzzy Relations.	**13**
UNIT V Fuzzy Systems: Crisp logic: Laws of Propositional Logic-Inference in propositional Logic.	**13**

Predicate logic: Interpretations of Predicate Logic Formula – Inference in Predicate Logic. Fuzzy logic: Fuzzy Quantifiers – Fuzzy Inference, Fuzzy rule based system – Defuzzification.

Total Hours	65

Italicized texts are for self study

Power point Presentations, Seminar , Assignment, Experience Discussion, Brain storming

Text Books

1. S.Rajasekaran, G.A.VijayalakshmiPai, "Neural Networks, Fuzzy logic, and Genetic Algorithms Synthesis and Applications, PHI, 2005.

Reference Books

1. James A. Freeman, David M. Skapura, "Neural Networks-Algorithms, Applications, and Programming Techniques", Pearson Education.
2. Fredric M. Ham, IvicaKostanic, "Principles of Neuro computing for science of Engineering", TMCH.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	S
CO2	H	M	H	S	H
CO3	L	S	S	S	M
CO4	M	H	H	M	H
CO5	M	H	H	M	M

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: K.Kannika Parameswari	Name: Dr.M.Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	Programme Title :		Master of Computer Science	
Course Code:	19PCS3E3	Title		Batch :	2019-2021
		ELECTIVE – I : Mobile Computing		Semester	II
Hrs/Week:	5			Credits:	5

Course Objective

On successful completion of the course the students should understand Mobile Computing Architecture and Emerging Technologies and understand about fundamentals of GSM and CDMA Technologies.

Course Outcomes (CO)

K1	CO1	To remember the features and challenges of mobile devices, native app development frameworks, hybrid app development frameworks
K2	CO2	To understand and select appropriate framework for developing applications based on the problem requirements
K3	CO3	Apply the UI components, multimedia usage, location based services, data storage mechanisms for the given problem
K4	CO4	Design an application based on the user requirements
K5	CO5	Be able to apply problem solving approaches to work challenges and make decisions using sound engineering methodologies

CONTENTS	Hours
UNIT I *Introduction***:** Mobility of Bits and Bytes – Wireless-the beginning – Mobile computing – Dialog control – Networks – Middle ware and gateways – Application and Services– Developing Mobile computing applications – Security in Mobile computing – Standards –Why is it necessary? – Standard bodies – Players in the wireless space. **Mobile Computing Architecture:** History of computers – History of internet– Internet-the Ubiquitous Network – Architecture for mobile computing – Three-Tire architecture – Design considerations for mobile computing – Mobile computing through Internet– Making Existing applications Mobile-enabled.	**13**
UNIT II *Mobile Computing Through Telephony:* Evolution of telephony – Multiple access procedures – Mobile computing through telephone – Developing an IVR application –Voice XML – Telephony applications programming interface(TAPI). *Emerging Technologies*: Introduction – Bluetooth – Radio Frequency Identifications (RFID) – Wireless Broadband (WiMAX) – Mobile IP – Internet Protocol Version 6 (IPv6) – Java card.	**13**
UNIT III *Global System For Mobile Communication (GSM):* GSM Architecture –GSM Entities – Call routing in GSM – PLMN Interfaces – GSM Address and Identifiers –Network aspects in GSM – GSM frequency allocation – Authentications and Security. **Short Message Services (Sms):** Mobile computing over SMS – Short Message Services (SMS) – Value added services through SMS – Accessing SMS bearer.	**13**
UNIT IV *General Packet Radio Service (GPRS):* GPRS and Packet data network –GPRS Network	**13**

architecture – GPRS Network operations – Data services in GPRS –Applications for GPRS – Limitations of GPRS – Billing and charging in GPRS. *Wireless Application Protocol (WAP):* WAP – MMS – GPRS applications.	
UNIT V *CDMA and 3G:* Spread Spectrum technology – Is-95 – CDMA Vs GSM – Wireless data– 3rd Generation networks – Applications on 3G. *Wireless LAN:*Advantages – IEEE 802.11 Standards – Wireless LAN architecture –Mobility in Wireless LAN – Deploying Wireless LAN – Mobile ADHOC networks and Sensor networks – Wireless LAN Security – Wi-Fi Vs 3G.	**13**
Total Hours	**65**
Italicized texts are for self study	
Power point Presentations, Seminar , Assignment, Experience Discussion, Brain storming	
Text Books	
1. Ashoke K Talukder, Roopa R Yavagal, "Mobile Computing", Tata McGraw –Hill, 2005, Fourth Reprint 2007.	
Reference Books	
1. Jochen H. Schller, "Mobile Communications", Second Edition, Pearson Education, New Delhi, 2007. 2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.	

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	S
CO2	H	M	H	S	H
CO3	L	S	S	S	M
CO4	M	H	H	M	H
CO5	H	M	L	H	M

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: N.Yasodha	Name: Dr.M.Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS2N1	Title	Batch :	2019-2021
		Non-Major Elective I:	Semester	II
Hrs/Week:	1	Multimedia Packages Lab	Credits:	2

Course Objective

On successful completion of the course the students should understand the concepts of Photoshop, Flash and Macromedia Director.

Course Outcomes (CO)

K3	CO1	To implement the concepts of Image segmentation and video segmentation
K4	CO2	To analyze the concepts of Storage models and Access Techniques of Multimedia devices
K5	CO3	To access Text, Audio Text and Audio tools

	PHOTOSHOP	**FLASH**
	- Use of basic tools - Merging two images - Cloning an image - Changing color of an image - Give Light effect to the image - Icy Image - Paint and Rainbow effect - Design a flex for college using Photoshop - Rain effect *Bubbled effect*	- Motion Tween - Text Bouncing - Text Animate - Image fading - Butterfly Animation *Bouncing Ball* **MACROMEDIA DIRECTOR** - Basic Animation - Slide Interaction

Italicized texts are for self study

Power point Presentations , Brain storming, Activity

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	S
CO2	H	M	H	H	H
CO3	M	S	S	M	M

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: R.Nandhakumar	Name: Dr.M.Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	Programme Title :		Master of Computer Science	
Course Code:	19PCS2N2	Title		Batch :	2019-2021
		Non-Major Elective I: Web Designing Lab		Semester	II
Hrs/Week:	1			Credits:	2

Course Objective

The objective of this course is to enable the students to develop and design various applications using Web Technology.

Course Outcomes (CO)

K3	CO1	To apply critical thinking skills to design and create websites
K4	CO2	To analyze and write a well formed / valid XML document
K5	CO3	To access and analyze website performance by interpreting analytics to measure site traffic, SEO, engagement, and activity on social media

• HTML Tags • Tables • Forms • Frames • Web Creation • CSS Rules • CSS Grouping Style • XML using CSS	• *Address Book* • DTD for Book Information • Resume Creation using DTD • XSL Transformation • XSL Sorting • Event Handling • Filters

Italicized texts are for self study

Power point Presentations, Experience Discussion, Brain storming, Activity

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	H	S
CO2	H	M	S	L	H
CO3	S	S	S	M	M

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name:N.Arulkumar	Name: Dr.M. Sakthi	Name: Dr. M. Durairaju	Name: Dr. R.Muthukumaran
Signature:	Signature:	Signature:	Signature:

SEMESTER III

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS313	Title	Batch :	2019-2021
		Angular JS	Semester	III
Hrs/Week:	4		Credits:	4

Course Objective

On successful completion of this course, students will be able to create dynamic web applications that depend on the Model-View-Controller architecture, and also to minimize the dependence on JavaScript requirement for functionalizing the web applications.

Course Outcomes (CO)

K1	CO1	To recollect the fundamental concepts of javascript
K2	CO2	To get the idea about AngularJS framework and Model View Controller(MVC)
K3	CO3	To deploy the programs using filters, modules, controllers and directives
K4	CO4	To review the various services and server communications
K5	CO5	To validate the forms by using model binding

CONTENTS	Hours
UNIT I **JavaScript:** Introduction- Including Scripts on a Page- Statements- Functions- Parameters and Return Values- Types and Variables- *Primitive Types*- JavaScript Operators- Equality vs. Identity- Pre- vs. Post-Increment- **Working with Objects:** Creating Objects- Reading and Modifying an Object's Properties- Adding Methods to Objects- Enumerating Properties- Control Flow- Working with Arrays- Callbacks- JSON.	**10**
UNIT II **AngularJS:** Basics of AngularJS-Framework- Downloading and Installing AngularJS- Browser Support- First AngularJS Application- Declarative vs. Procedural Programming- Directives and Expressions- **Introduction to MVC:** Design Patterns- Model View Controller- Why MVC- MVC the AngularJS Way- **Filters and Modules:** Introduction to Filters- Built-in Filters- The Number Filter- The Date Filter- The limitTo Filter- AngularJS Modules- Bootstrapping AngularJS- Creating a Custom Filter	**10**
UNIT III **Controllers** : Defining Controllers- Creating and Applying Controllers – **Scopes:** Setting up the scope- Modifying the Scope-**Directives:** Basics of Directives- Using Directives- Built-in Directives- Event-Handling Directives- Creating a Custom Directive- **Working with Forms:** *HTML Forms Overview*- Model Binding- AngularJS Forms- Validating Forms	**10**
UNIT IV **Services and Server Communication:** Using Services- The $window Service- The $location Service- The $document Service- Creating Services- Server Communication- Handling Returned Data- **Organizing Views:** Installing the ngRoute Module- Using URL Routes- Defining Routes- Route Parameters- Eager vs. Conservative Routes- Route Configuration Options- HTML5 Mode.	**10**
UNIT V **AngularJS Animation:** Installing the ngAnimate Module- CSS Animation Overview- Applying	**10**

Animations- **Deployment Considerations:** Configuration- Testing- Error Handling- Hide Unprocessed Templates- Minification and Bundling- Managing the Build Process- Deployment.	
Total Hours	**50**

Italicized texts are for self study

Power point Presentations, Seminar , Assignment, Brain storming

Text Books

1. Andrew Grant, "Beginning AngularJS", 1st Edition, Apress, 2014

2. Adam Freeman, "Pro AngularJS", 1st Edition, Apress, 2014

Reference Books

1.Brad Green and Shyam Seshadri , "AngularJS – Up and Running", 2nd Edition, O' Reilly,2014

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	H	H	H	S
CO2	H	H	M	S	M
CO3	M	S	H	H	H
CO4	S	M	S	H	M
CO5	H	S	M	M	H

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name:N.ArulKumar	Name: Dr.M. Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS314	Title	Batch :	2019-2021
		Digital Image Processing	Semester	III
Hrs/Week:	5		Credits:	4

Course Objective

On successful completion of the course the students should understand the features of Java and the Web services.

Course Outcomes (CO)

K1	CO1	Get broad exposure and understanding of various applications of image processing in industry, medicine, and defense and other applications.
K2	CO2	To be familiar with basic concepts of two-dimensional signal acquisition, sampling, and quantization
K3	CO3	To implement the fundamental image enhancement algorithms such as histogram modification, contrast manipulation, and edge detection.
K4	CO4	To analyze programming skills in image compression, segmentation and restoration techniques.
K5	CO5	To access MRI scanned digital images and process using MATLAB

CONTENTS	Hours
UNIT I **Introduction:** What is Digital image processing – the origin of DIP – Examples of fields that use DIP – Fundamentals steps in DIP – Components of an image processing system. **Digital Image Fundamentals:** *Elements of Visual perception* – Light and the electromagnetic spectrum – Image sensing and acquisition – Image sampling and Quantization– Some Basic relationship between Pixels – Linear & Nonlinear operations.	**13**
UNIT II **Image Enhancement in the spatial domain:** Background – *some basic Gray level Transformations* – Histogram Processing – Enhancement using Arithmetic / Logic operations –Basics of spatial filtering – Smoothing spatial filters – Sharpening spatial filters – combining spatial enhancement methods.	**13**
UNIT III **Image Restoration:** A model of the Image Degradation / Restoration Process – Noise models – Restoration is the process of noise only – Spatial Filtering – Periodic Noise reduction by frequency domain filtering –Modeling the Degradation function –Direct Inverse Filtering-Wiener Filtering-Constrained Least Squares (Regularized) Filtering - Iterative Nonlinear Restoration using the Lucy-Richardson Algorithm-*Blind Deconvolution.*	**13**
UNIT IV **Image Compression:** Fundamentals – Image compression models – Elements of Information Theory – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – *Image compression standards*	**13**
UNIT V **Image Segmentation: P**oint, Line and Edge Detection–Line Detection Using the Hough	**13**

Transform– *Thresholding* – Region-Based segmentation – Segmentation by Morphological watershed Transform.	
Total Hours	**65**

Italicized texts are for self study

Power point Presentations, Seminar , Assignment

Text Books

1. Rafael C. Gonzalez, Richard E. Woods, 2009, "Digital Image Processing", 3rd Edition, PHI/Pearson Education(Unit 1,Unit 2,Unit 4)
2. Rafael C. Gonzalez, Richard E.Woods,Steven L.Eddins, 2005, "Digital Image Processing Using MATLAB" , 2nd Edition , Tata McGraw-Hill International Editions(Unit 3,Unit 5)

Reference Books

1. Nick Efford, 2004, "Digital Image Processing a practical introducing using Java", Pearson Education
2. Chanda.B, Dutta Majumder.D, 2003, "Digital Image Processing and Analysis", PHI

MAPPING

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	H	S
CO2	H	H	H	S	M
CO3	M	S	S	M	M
CO4	S	H	H	S	H
CO5	M	H	S	H	M

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: P. Jayapriya	Name: Dr.M. Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	**Programme Title :**		Master of Computer Science	
Course Code:	19PCS315	**Title**		**Batch :**	2019-2021
		Internet of Things		**Semester**	III
Hrs/Week:	5			**Credits:**	4

Course Objective

On successful completion of students will understand the fundamentals of Internet of Things, IoT Protocols, built a small low cost embedded system using Raspberry Pi and to apply the concept of Internet of Things in the real world scenario

Course Outcomes (CO)

K1	CO1	To remember web services to access/control IoT devices
K2	CO2	To understand the portable IoT using Raspberry Pi
K3	CO3	To deploy use of IoT application and connect to the cloud
K4	CO4	To analyze various protocols for IoT
K5	CO5	To evaluate Real World IoT Design Constraints, Industrial Automation in IoT.

CONTENTS	Hours
UNIT I **Introduction to IoT:** Internet of Things – Physical Design – Logical Design – IoT Enabling Technologies – IoT Levels & Deployment Templates – Domain Specific IoTs – IoT and M2M – IoT System Management with NETCONF – YANG – IoT Platforms Design Methodology.	**13**
UNIT II **IoT Architecture:** M2M high-level ETSI Architecture – IETF Architecture for IoT – OGC Architecture – IoT Reference model – Domain model -information model - functional model –communication model - IoT Reference Architecture.	**13**
UNIT III **IoT Protocols:** Protocol Standardization for IoT – Efforts – M2M and WSN Protocols - SCADA and RFID Protocols – Unified Data Standards - Protocols – IEEE 802.15.4 – BACNet Protocol - Modbus – Zigbee Architecture - Network Layer – 6LowPAN – CoAP – Security.	**13**
UNIT IV **Building IoT with RASPBERRY Pi and ARDUINO:** Building IoT with RASPBERRY Pi – IoT Systems – Logical Design using Python – IoT Physical Devices and Endpoints – IoT Device – Building blocks – Raspberry Pi – Board – Linux on Raspberry Pi – Raspberry Pi Interfaces - Programming Raspberry Pi with Python – *Other IoT Platforms* - Arduino	**13**
UNIT V **Case studies: IoT Design**-Home Automation, Cities, Environment, Agriculture, Productivity Applications. **Real world design constraints** – Applications – Asset management, Industrial automation, smart grid ,Commercial building automation ,Smart cities – participatory sensing – Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs – Cloud for IoT – *Amazon Web Services for IoT*.	**13**

Total Hours	65

Italicized texts are for self study

Power point Presentations, Seminar , Assignment

Text Book

1. Arshdeep Bahga , Vijay Madisetti , "Internet of Things –A hands –on Approach", Universities Press 2015.

Reference Books

1. Dieter Uckelmann , Mark Harrison, Michahelles,Florian(Eds), "Architecting the Internet of Things", Springer,2011.
2. Honbo Zhou , "The Internet of Things in the cloud: A Middleware Perspective", CRC Press,2012.
3. Jan Holler ,Vlasios Tsiatsis ,Catherine Mulligan , Stamatis , Karnouskos Stefan Avesand , David Boyle ," From Machine – to- Machine to the Internet of Things – Introduction to a New Age of Intelligence", Elsevier 2014.

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	S
CO2	S	M	M	S	L
CO3	M	H	S	H	M
CO4	M	H	H	M	H
CO5	S	M	M	S	L

 S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name:N.Karthikeyan	Name: Dr.M.Sakthi	Name: Dr. M. Durairaju	Name:Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS316	Title	Batch :	2019-2021
		Programming Lab-VI: Angular JS	Semester	III
Hrs/Week:	5		Credits:	4

Course Objective

On successful completion of this course, students will gain the knowledge about the AngularJS framework and also to apply its various concepts in real-time web application development.

Course Outcomes (CO)

K3	CO1	To implement the programs for filters, modules, controllers and directives
K4	CO2	To evaluate the applications by applying the services, routes and animations
K5	CO3	To validate the forms by using model binding and events

Program using AngularJS

1. Expressions
2. Modules
3. Directives
4. Model
5. Controllers
6. Filters
7. Services
8. Events
9. Forms
10. Form Validation
11. Routing
12. Animations

Power point Presentations, Brain storming

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	H	H	S	H
CO2	H	M	M	M	S
CO3	H	S	S	H	M

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: N.ArulKumar Signature:	Name: Dr.M.Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS317	Title	Batch :	2019-2021
		Programming Lab-VII : Digital Image Processing using MATLAB	Semester	III
Hrs/Week:	5		Credits:	4

Course Objective

On successful completion of the course the students should understand about Image Processing, image compression and segmentation using MATLAB.

Course Outcomes (CO)

K3	CO1	To implement the fundamental image enhancement algorithms such as histogram modification, contrast manipulation, and edge detection.
K4	CO2	To analyze programming skills in image compression, segmentation and restoration techniques.
K5	CO3	To access MATLAB tools for image processing

1. Crop, Resize, Rotate an image
2. Crop an image using Simulink
3. Resize an image using Simulink
4. Rotate an image using Simulink
5. Adjusting the contrast in color image using Simulink
6. Adjusting the contrast in intensity image using Simulink
7. Finding Histogram of a RGB image
8. Finding Histogram of a gray and negative image
9. Arithmetic Operations
10. Blurring with Deconvolution Algorithm
11. Sharpening of an image using Simulink
12. Unsharp Masking and High Boost Filtering using Simulink
13. Removing Salt & Pepper noise
14. Remove Noise (Median Filter) using Simulink
15. Deblurring with Wiener Filter
16. Correct Non-Uniform Illumination using Simulink
17. Count Object in an image using Simulink
18. Image Compression using Discrete Cosine Transform.
19. Performing Morphological Operations.
20. Edge Detection using Prewitt, Sobel and Roberts.

Note: Laboratory works are to be done on MATLAB 7.0 tool.

Power point Presentations, Assignment, Experience Discussion, Brain storming

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	S
CO2	S	M	H	S	H
CO3	M	S	S	M	M

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: P.Jayapriya Signature:	Name: Dr.M.Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature:

ELECTIVE – II

Programme Code:	M.Sc	Programme Title :		Master of Computer Science
Course Code:	19PCS3E1	Title	Batch :	2019-2021
		ELECTIVE – II: Artificial Intelligence and Expert Systems	Semester	III
Hrs/Week:	5		Credits:	5

Course Objective

On successful completion of the course the students have basic understanding of overview of artificial intelligence (AI) principles and approaches and enable the student to apply these techniques in applications which involve perception, reasoning and learning

Course Outcomes (CO)

K1	CO1	To remember basic exposition to the goals and methods of Artificial Intelligence
K2	CO2	To understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.
K3	CO3	To apply these techniques in applications which involve perception, reasoning and learning.
K4	CO4	To analyze and design a real world problem for implementation and understand the dynamic behavior of a system.
K5	CO5	To evaluate and design a real world problem for implementation and understand the dynamic behavior of a system

CONTENTS	Hours
UNIT I Problem solving and AI – Puzzles and Games – Problem States and operators – Heuristic programming – state space representations – state descriptions – graph notations – non-deterministic programs.	**13**
UNIT II State space search methods – breadth first and depth first search – heuristic – admissibility – optimality of algorithms – performance measures – problem reduction representations – AND/OR graphs and higher level state space.	**13**
UNIT III Problem reduction search methods – cost of solution trees – ordered search – alpha beta and minimum procedure – theorem proving in predicate calculus – syntax, semantics, Herbrand universe: variables, qualifiers, unification, resolvents.	**13**
UNIT IV Predicate calculus in problem solving – answer extraction process – resolution – Automatic program writing – predicate calculus – proof finding methods.	**13**
UNIT V Expert systems: Expert systems and conventional programs – expert system organization – Knowledge engineering: knowledge representation techniques – knowledge acquisition – acquiring knowledge from experts – automating knowledge acquisition –Building an expert system – difficulties in developing an expert system.	**13**
Total Hours	**65**

Italicized texts are for self study

Power point Presentations, Seminar , Assignment

Text Books
1. E Charnail, CK Reiesbeck and D V Medermett, "Artificial Intelligence Programming", Lawrence Erlbaum Associates, N J, 2011.
2. Donald A Waterman, "A Guide to Expert Systems", Tech knowledge series in knowledge engineering, 2010.

Reference Books
1. N J Nilson, "Principles of Artificial Intelligence" , Tiega Press, Polo Alto, 2009.
2. Elain Rich and Kevin Knight, "Artificial Intelligence", McGraw Hill, 2000.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	H	S
CO2	M	H	M	S	H
CO3	M	S	S	M	H
CO4	H	H	H	S	M
CO5	M	S	S	M	H

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: N.Karthikeyan	Name: Dr.M.Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme code:	M.Sc	**Programme Title :**	Master of Computer Science
Course Code:	19PCS3E2	**Title**	**Batch :**	2019-2021
		ELECTIVE – II: Machine Learning	**Semester**	III
Hrs/Week:	5		**Credits:**	5

Course Objective

On Successful completion of the course the students should gain knowledge on application of computer methods for management, analysis, interpretation, and prediction, as well as for the design of experiments.

Course Outcomes (CO)

K1	CO1	To remember main areas of Machine Learning: supervised and unsupervised.
K2	CO2	To understand a wide variety of learning algorithms.
K3	CO3	To apply a variety of learning algorithms to data
K4	CO4	To analyze how to perform evaluation of learning algorithms and model selection
K5	CO5	To design and implement various machine learning algorithms in a wide range of real-world applications

CONTENTS	Hours
UNIT I **MACHINE LEARNING FOUNDATIONS** - Introduction-Bayesian modeling-Cox Jaynes axioms- Bayesian inference and induction- models structures examples.	**13**
UNIT II **MACHINE LEARNING ALGORITHMS -** *Dynamic programming*- EM/ GEM algorithms-Markov chain Monte carlo methods- simulated annealing genetic algorithm-Neural networks.	**13**
UNIT III **APPLICATIONS -** Sequence coding- correlations- Prediction: secondary structure, signal peptides and cleavage sites-applications for DNA & RNA nucleotide sequences-Performance evaluation.	**13**
UNIT IV Introduction- likelihood & Basic algorithms- Learning algorithms- Applications: general aspects, proteins, DNA and RNA.	**13**
UNIT V Models for phylogeny-substitution probabilities-Data likelihood-*optimal trees*- modeling for array data.	**13**
Total Hours	**65**
Italicized texts are for self study	
Power point Presentations, , Seminar, Assignment	

Text Books:

1. Andrea Isoni, 2016, "Machine Learning for Web", Kindle Edition.

2. Matthew Krik, 2014, "Thought Machine Learning", Kindle Edition.

Reference Books:

1. Steffen Schulze-Kremer, "Molecular Bioinformatics: Algorithms and Applications", Walter de Gruyter, 2013.

2. Yi-Ping Phoebe. Chen, "Bioinformatics Technologies", Springer, 2015.

3. Zheng Rong Yang, "Machine Learning Approaches to Bioinformatics" (Science, Engineering, and Biology Informatics), World Scientific Publishing Company; 1 edition 2010.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	M
CO2	H	M	H	H	L
CO3	H	M	H	M	H
CO4	M	S	H	H	S
CO5	M	H	L	M	S

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: Dr.M.Sakthi Signature:	Name: Dr.M.Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature:

Programme code:	M.Sc	Programme Title :	Master of Computer Science	
Course Code:	19PCS3E3	Title	Batch :	2019-2021
		ELECTIVE – II: Embedded Systems	Semester	III
Hrs/Week:	5		Credits:	5

Course Objective

On successful completion of the course the students should gain knowledge on Hardware fundamentals, Software Architecture, Interrupts, Embedded software lifecycle and tools.

Course Outcomes (CO)

K1	CO1	To remember the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.
K2	CO2	To understand the RTOS and its programming aspects.
K3	CO3	To apply the of design real time embedded systems using the concepts of RTOS.
K4	CO4	To Analyze various examples of embedded systems based on ATOM processor.
K5	CO5	To evaluate hardware fundamentals, interrupts, RTOS environment Basic design, embedded software Lifecycle, Software development tools.

CONTENTS	Hours
UNIT I Hardware Fundamentals: Terminology-Gates-Timing Diagrams-Memory Advanced Hardware Fundamentals: Microprocessors-Microprocessor architecture-Direct Memory Access-Conventions and Schematics-Introduction to embedded systems: An embedded system-Processor in the system-Exemplary embedded systems.	**13**
UNIT II Interrupts and Software Architecture Interrupts: Interrupt basics-Interrupt service routines Survey of Software Architectures: Round Robin with interrupts-Function-Queue-Scheduling Architecture-Real Time Operating Systems Architecture Introduction to Real Time Operating Systems: Selecting in RTOS-Tasks and Task States-Tasks and Data-Semaphores and shared data.	**13**
UNIT III Concepts of RTOS More Operating System Services: Interrupt process communication-Message queues-Mailboxes and pipes-Timer functions-Events-Memory management-interrupt routines in an RTOS environment Basic design using a Real Time Operating System: Principles-encapsulating semaphores and queues-hard real time scheduling considerations-saving memory space and power-introduction to RTL & QNX.	**13**
UNIT IV Embedded software life cycle and tools Embedded software Lifecycle: Software Algorithm complexity-Software development process life cycle and its models.	**13**
UNIT V Software development tools: development tools-hosts and target machine-linker/locators for embedded software-getting embedded software into the target machine Debugging techniques: testing on your host machine-instruction set simulators-the asset macro-using	**13**

laboratory tools - Case Study.	
Total Hours	**65**

Italicized texts are for self study

Power point Presentations, Seminar , Assignment

Text Books

1. David.E.Simon, "An embedded system primer", Addison Wesley-2001.

2. Raj Kamal, "Embedded Systems architecture, programming and design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2003.

Reference Books
1. K.V. Shibu, Introduction To Embedded Systems, Tata McGraw, 2009.
2. Lori Matassa and Max Domeika, Break Away with Intel® Atom™ Processors,2010, Intel press.

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	H	S
CO2	M	H	M	S	H
CO3	M	S	S	M	H
CO4	H	H	H	S	M
CO5	M	H	M	S	H

S: Strong   H: High   M: Medium   L: Low

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: M.Meenakirithika Signature:	Name: Dr.M.Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature:

SEMESTER IV

Programme code:	M.Sc	Programme Title :		Master of Computer Science	
Course Code:	19PCS418	Title		Batch :	2019-2021
		Industrial Project Work and Viva voce (Individual)		Semester	IV
Hrs/Week:	-			Credits:	10

Instructional Notes: Students are required to develop entire new software system or to enhance/modify functionalities of existing software or to provide customization based on existing technology/framework to fulfill specific requirements.

MAXIMUM MARKS   : 200

Project Evaluation & Viva Voce   : 150 (Both Internal & External Examiner)

Paper Publications in UGC Journals : 50 (Only Internal Examiner)

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	**Name with Signature**	**CDC**	**COE**
Name: Dr.M. Sakthi	Name: Dr.M. Sakthi	Name: Dr. M. Durairaju	Name: Dr. R. Muthukumaran

Signature:	Signature:	Signature:	Signature: