P.G. DEPARTMENT OF COMPUTER SCIENCE (SF)

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 (SF)

BATCH 2018-2020

Scheme of Examination

I SEMESTER								
Part	**Subject Code**	**Title of the Paper**	**Duration in Hours per week**	**Examination**				**Credits**
				Hours	**CIA**	**ESE**	**Total**	
III	18PCS101	Android Programming	5	3	25	75	100	4
	18PCS102	Design and Analysis of Computer Algorithms	5	3	25	75	100	4
	18PCS103	Information Security	5	3	25	75	100	4
	18PCS1E1	Elective-I: Data Mining and Warehousing	5	3	25	75	100	5
	18PCS104	Programming Lab - I: Android Programming	5	3	40	60	100	4
	18PCS105	Programming Lab –II: Design and Analysis of Computer Algorithms	5	3	40	60	100	4
II SEMESTER								
III	18PCS206	Python Programming	4	3	25	75	100	4
	18PCS207	Advanced Networks	4	3	25	75	100	4
	18PCS208	Big Data Analytics	4	3	25	75	100	4
	18PCS2E1	Elective – II : Computing Technologies	5	3	25	75	100	5
IV	18PCS2N1/ 18PCS2N2	Non Major Elective: Multimedia Packages Lab /Web Designing Lab	1	3	-	100	100	2
III	18PCS209	Programming Lab -III : Python Programming	4	3	40	60	100	4
	18PCS210	Programming Lab-IV : Networks	4	3	40	60	100	4

III	18PCS211	Programming Lab-V : Unified Modeling Language and R Tool	3	3	40	60	100	4
III SEMESTER								
Part	**Subject Code**	**Title of the paper**	**Duration in Hrs per week**	**Examination**				**Credits**
				Hours	**CIA**	**ESE**	**Total**	
III	18PCS312	J2EE Technologies	4	3	25	75	100	4
	18PCS313	Digital Image Processing	5	3	25	75	100	5
	18PCS314	Internet of Things	5	3	25	75	100	4
	18PCS3E1	Elective-III: Soft Computing	5	3	25	75	100	5
	18PCS315	Programming Lab-V : J2EE Technologies	5	3	40	60	100	4
	18PCS316	Programming Lab-VI: Digital Image Processing using MATLAB	5	3	40	60	100	4
IV SEMESTER								
III	18PCS417	Industrial Project Work and Viva voce (Individual)	-	-	-	-	200	8
TOTAL MARKS							**2200**	**90**

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	A(Answer all)	10x01=10	MCQ/Define	75
K2	B (Either Or pattern)	05x05=25	Short Answers	
K3& K4	C (Answer 4 out of 6)	04x10=40	Descriptive/ Detailed	

2. Practical Examinations:

Knowledge Leve	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:	18PCS101	**Title**	**Batch :**	2018-2020
		Android Programming	**Semester**	I
Hrs/Week:	5		**Credits:**	05

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 understand 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.	

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 – Recycling Motion Events – Using Velocity Tracker – Multi-touch – Gestures. **Implementing**	**13**

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 ours", 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

PSO / CO	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

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 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:	18PCS102	**Title**	**Batch :**	2018-2020
		Design and Analysis of Computer Algorithms	**Semester**	I
Hrs/Week:	5		**Credits:**	04

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

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

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:	18PCS103	**Title**	**Batch :**	2018-2020
		Information Security	**Semester**	I
Hrs/Week:	5		**Credits:**	04

Course Objective

On successful completion of the course the students should understand the Technology Infrastructure, Electronic Commerce Software and Business Strategies and understand the fundamentals of security and how it attacks.

Course Outcomes (CO)

K1	CO1	To recollect the role of the major types of information systems in a business environment and their relationship to each other
K2	CO2	To deduce the impact of the Internet and Internet technology on business electronic commerce and electronic business
K3	CO3	To deploy an understanding of E-adverting, E-supply chain management and E-strategies
K4	CO4	To evaluate the understanding of security measures in network and web

CONTENTS	**Hours**
UNIT I **Introduction to Electronic Commerce:** Electronic Commerce– Business Models, Revenue Models, and Business Processes – Economic Forces and Electronic Commerce – Identifying Electronic Commerce Opportunities – International Nature of Electronic Commerce. **Technology Infrastructure**: The Internet and the World Wide Web– *Internet and World Wide Web* – Packet – Switched Networks – Internet Protocols – Markup Languages and the Web – Intranets and Extranets – Internet Connection Options - Internet2 and The Semantic Web.	**13**
UNIT II **E-Marketing:** Online Marketing – E-Advertising-E-branding-**E-Security:** information system security-security on the internet – **E-Payment Systems:** Digital token based e-payment systems- classification of new payment systems-check payment systems on the internet. **E-Customer Relationship Management:** customer relationship management-typical business touches points. **E-Supply Chain Management:** smart chains-smarter gains-E-supply chain components-e-supply chain architecture.	**13**
UNIT III **E-Strategy:** Changes in technology-definitions of knowledge-importance of knowledge management-stages-seven dimensions-value chain and e-strategy **Mobile Commerce:** Technologies for Mobile Commerce– WAP Programming Model – Wireless Technologies – Different Generations in Wireless Communication – Security issues Pertaining to Cellular Technology –M-Commerce in India	**13**
UNIT IV **Network security:** authentication applications: Kerberos –x.509 authentication service-**E-mail Security:** Pretty Good Privacy, S/MIME (Secure/Multipurpose Mail Extension). IP security.	**13**

UNIT V **System & Web Security:** Malicious Software: Viruses and Related threats, Virus counter measures, distributed Denial of service attacks. Firewalls: Firewall, Firewall Design Principles, Trusted Systems. **Web Security:** Web Security Considerations, Secure socket layers, Transport Layer Security-Secure Electronic Transaction.	**13**
Total Contact Hrs	**65**

**Italicized* texts are for self study

Power point Presentations, Seminar , Assignment

Text Books

1. Gary P. Schneider, 2012, "E-Commerce Strategy, Technology and Implementation", 9th Edition, CENGAGE Learning India Private Limited (Unit I).
2. P.T. JOSEPH, 2013, "E-Commerce an Indian Perspective", Fourth Edition, Prentice Hall of India (Unit II & Unit III).
3. William Stalling, 2006, "Cryptography and Network Security Principle and Practice", 4rd Edition, Pearson Publications (Unit IV&V).

Reference Books

1. Mike Papazologn, 2008, "E-Business, Organizational and Technical Foundations", Wiley India Pvt Ltd.,
2. Elias M. Awad, 2008, "Electronic Commerce", Prentice-Hall of India.
3. Panko Stalling , 2000, "Cryptography and Network Security Principle and Practice", 3rd Edition
4. Bruce Schneir, 2000, "Applied Cryptography", CRC Press.

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

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.S. Shanthi Signature:	Name: Dr.M.Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature:

ELECTIVE - I

Programme code:	M.Sc	**Programme Title :**	Master of Computer Science	
Course Code:	18PCS1E1	**Title**	**Batch :**	2018-2020
		ELECTIVE- I Data Mining and Warehousing	**Semester**	I
Hrs/Week:	5		**Credits:**	05

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

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 aspects of data mart. **Online analytical processing:** Introduction - OLTP & OLAP systems– data modeling – star schema for multidimensional view – data modeling – multifact star	**13**

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.

1. **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

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:	18PCS104	**Title**	**Batch :**	2018-2020
		Programming Lab-I: Android Programming	**Semester**	I
Hrs/Week:	5		**Credits:**	04

Course Objective

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

Course Outcomes (CO)

K3	CO1	Use the Java programming language to build Android applications and use development tools in the Android development environment	
K4	CO2	To Make UI-rich apps using all the major UI components like Fragments and the Action Bar,Layouts,various controls	
K5	CO3	To Store 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 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:	18PCS105	**Title**	**Batch :**	2018-2020
		Programming Lab-II: Design and Analysis of Computer Algorithms	**Semester**	I
Hrs/Week:	5		**Credits:**	04

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: N.Arulkumar Signature:	Name: Dr.M.Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature:

SEMESTER II

Programme code:	M.Sc	**Programme Title :**	Master of Computer Science	
Course Code:	18PCS206	**Title**	**Batch :**	2018-2020
		Python programming	**Semester**	II
Hrs/Week:	4		**Credits:**	04

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

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.	**11**
UNIT III **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 IV **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.	**11**
UNIT V **Files and Exceptions:** Introduction to File Input and Output-Using loops to process files-Processing |Records-Exception. **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.	**10**
Total Hours	**52**

* *Italicized* texts are for self study

Power point Presentations, Group discussions, Seminar , Assignment

Text Books

1. E Balagurusamy , "Introduction to computing and problem solving using python" , McGrawHill publication,2016
2. Tony Gaddis," Starting out With Python"(3e)

Reference Book

1. Mark Lutz ,"Learning Python", 5th Edition, 2013
2. Welsey J. Chun, "Core Phython Programming", Prentice Hall, 2001

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

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 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:	18PCS207	**Title**	**Batch :**	2018-2020
		Advanced Networks	**Semester**	II
Hrs/Week:	4		**Credits:**	05

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

CONTENTS	**Hours**
UNIT I **Introduction and overview:** The Motivation For Internetworking-The TCP/IP Internet-Internet Services-History and scope of the Internet-The Internet Architecture Board-The IAB Reorganization. Review of Underlying **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-Mapping **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).	**10**
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.	**11**
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.	**10**

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.	**10**
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)-Network Management (SNMP)-A Next Generation IP (IPv6).	**11**
Total Hours	**52**

**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

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:	18PCS208	**Title**	**Batch :**	2018-2020
		Big Data Analytics	**Semester**	II
Hrs/Week:	4		**Credits:**	04

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 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.

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 Ecosystem	**11**

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.	**11**
Total Hours	**52**

**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", First 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

CO \ PSO	**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

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:

ELECTIVE – II

Programme code:	M.Sc	**Programme Title :**	Master of Computer Science	
Course Code:	18PCS2E1	**Title**	**Batch :**	2018-2020
		ELECTIVE- II:	**Semester**	II
Hrs/Week:	5	Computing Technologies	**Credits:**	05

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

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 **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	**13**

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

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 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:	18PCS2N1	**Title**	**Batch :**	2018-2020
		Non-Major Elective I:	**Semester**	II
Hrs/Week:	1	Multimedia Packages Lab	**Credits:**	02

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

- 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*

FLASH

- 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 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:	18PCS2N2	**Title**	**Batch :**	2018-2020
		Non-Major Elective I: Web Designing Lab	**Semester**	II
Hrs/Week:	1		**Credits:**	02

Course Objective

To enable the students to develop and design various application 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:R. Nandhakumar 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:	18PCS209	**Title**	**Batch :**	2018-2020
		Programming Lab-III : Python Programming	**Semester**	II
Hrs/Week:	4		**Credits:**	04

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.

Power point Presentations, Experience Discussion, Brain storming

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:R.Nandhakumar 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:	18PCS210	**Title**	**Batch :**	2018-2020
		Programming Lab-IV: Networks	**Semester**	II
Hrs/Week:	4		**Credits:**	04

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 deploy and implement next generation protocols required for emerging applications
K4	CO2	To analyze different protocols used for packet communication
K5	CO3	To access Client/Server interaction

1. Program to generate IP of the machine
2. Program to implement Ping Server using raw sockets
3. Program to demonstrate the PING command
4. Program to establish Single side communication using TCP
5. Program to establish Double side communication using TCP
6. Program to establish Single side communication using UDP
7. Program to establish Double side communication using UDP
8. Program to establish Chatting
9. Program to Parse URL Address into its components
10. Program to read Source code of a Website
11. Program to find the IP address of a given Website
12. Program to generate Conversion of lowercase to uppercase
13. Program to implement UDP packets Send and Receive
14. Program to generate Asynchronous Protocol
15. Program to implement Stop and Wait Protocol
16. Program to implement the Concurrent Server
17. Program to demonstrate the ECHO command
18. Program to establish Gossip Client and Server
19. Program to implement the concept of CRC
20. Program to establish a Command line who is client
21. Program to validate a Client Password
22. Program to find Shortest Path Routing between nodes
23. Program to send a mail using SMTP
24. Program to Download a file from the internet and save a copy
25. Program to establish the concept of Sliding Window Protocol
26. Program to calculate the Area with the radius between C/S
27. Program to print DNS record of an internet address
28. Program to implement User Interface
29. Program to perform File Transfer using FTP
30. Program to send a single message to multi-client[Broadcasting]
31. Program to generate Date time Client and Server

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:R.Nandhakumar 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:	18PCS211	**Title**	**Batch :**	2018-2020
		Programming Lab-V: Unified Modeling Language and R Tool	**Semester**	II
Hrs/Week:	3		**Credits:**	04

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

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

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.

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

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 Signature:	Name: Dr.M.Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature:

SEMESTER III

Programme code:	M.Sc	**Programme Title :**	Master of Computer Science	
Course Code:	18PCS312	**Title**	**Batch :**	2018-2020
		J2EE Technologies	**Semester**	III
Hrs/Week:	4		**Credits:**	04

Course Objective

On successful completion of the course the students should understand the features of J2EE and the Web services.

Course Outcomes (CO)

K1	CO1	To recollect different constructors and methods in JFC components, JDBC, C/S interaction
K2	CO2	To get an idea to construct an enterprise application using Java Beans
K3	CO3	To implement server side validations with session and database using JDBC
K4	CO4	To analyze web application using Servlet, Java Server Pages and RMI

CONTENTS	Hours
UNIT I **Introduction to JFC:** JPanel-JFrame-JApplet-JSplitPane-JTabbedPane-JViewport-*JMenu*-Items and Labels - JTextField - JTextArea - JButtons - JButton Classes - JCheckBoxes - JRadioButton-JComboBoxes-JList.	**10**
UNIT II **Advanced JFC Components:** JTree s- *JTables* – JInternalFrame - JDesktop Manager - JProgressbar.	**10**
UNIT III Java Beans: Introduction to Java Bean-Advantages of a Java Bean-Application Builder tools-The Bean Developer Kit (BDK)-Jar files-Introspection-Developing a Simple Bean-Using Bound Properties-Using Bean Info Interface-Constrained Properties-Persistence-Customizers-Java Bean API.	**11**
UNIT IV **Servlet Overview and Architecture:** Movement to Server Side Java-Practical Applications for Java Servlets-Java Servlet Alternatives-Reason to use Java Servlets-Java Server Architecture – Servlet Basics-The Lifecycle of Servlet-A Basic Servlet. **Servlet Chaining:** Definition for Servlet Chaining-Uses of Servlet Chains-A Practical example using Servlet Chaining-Servlets and JDBC-Two Tier and Three Tier Database access models-JDBC Servlet-Session Tracking-Using Cookies-Using Session Objects.	**11**
UNIT V **Java Server Page (JSP):**Introduction-Server-side programming-Life Cycle of JSP- To Créâte and run JSP- Architecture of JSP-Scripting tag Elements- Implicite Object- Beans - Conditions - Directives - Déclarations – Implicite Variables -Expressions. **RMI (Remote Method Invocation):** Introduction - RMI Architecture-Bootstrapping and RMI Registry - The RMI Compiler - Object Specialization and Parameter Passing - A Simple example.	**10**
Total Hours	**52**

**Italicized* texts are for self study

Power point Presentations, Seminar , Assignment, Brain storming

Text Books

1. Patric Naughton,Herbert Schildt, 2001, " The Complete Reference-Java", 5th Edition, Tata McGraw Hill
2. Sams Series,James GoodWill, 2004, "Developing Java Servlets", 1st Edition, SAMS Techmedia
3. Dr.Sathya Raj pantham, 2000, "Pure Java Swing", 1st Edition, Tech Media Publication
4. Sam Series, 2006, "Java RMI", Tata McGraw Hill

Reference Books

1. Harley Hahn, 1996, "The Internet – Complete Reference", 2nd edition, Tata McGraw-Hill International Editions
2. Patric Naughton, 1996, "The Java Hand Book", 3rd Edition, Tata McGraw Hill
3. Stephen Potts, Mike Kopack, 2004, "Web Services", Kindle Edition, Pearson Education

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	H	S
CO2	M	M	H	S	H
CO3	H	S	H	H	M
CO4	S	H	S	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:R. Nandhakumar 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:	18PCS313	**Title**	**Batch :**	2018-2020
		Digital Image Processing	**Semester**	III
Hrs/Week:	5		**Credits:**	05

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.

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 –Image Reconstruction from projections.	**13**
UNIT IV **Image Compression:** Fundamentals – Image compression models – Elements of Information Theory – Error Free compression – Lossy compression – *Image compression standards*-coding redundancy-spatial redundancy	**13**
UNIT V **Image Segmentation:** Detection and Discontinuities – Edge Linking and Boundary deduction – Threshold – Region-Based segmentation – Segmentation by Morphological watersheds – The use of motion in segmentation.	**13**

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

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

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:

Programme code:	M.Sc	**Programme Title :**	Master of Computer Science	
Course Code:	18PCS314	**Title**	**Batch :**	2018-2020
		Internet of Things	**Semester**	III
Hrs/Week:	5		**Credits:**	04

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

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.
4. Olivier Hersent, David Boswarthick ,Omar Elloumi – "The Internet of things – Key applications and Protocols ",Wiley 2012.

.

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

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.S.Shanthi Signature:	Name: Dr.M.Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name:Dr. R. Muthukumaran Signature:

ELECTIVE – III

Programme code:	M.Sc	**Programme Title :**	Master of Computer Science	
Course Code:	18PCS3E1	**Title**	**Batch :**	2018-2020
		ELECTIVE – III : Soft	**Semester**	III
Hrs/Week:	5	Computing	**Credits:**	05

Course Objective

On successful completion of the course the students should understand the concepts of Neural Networks, architecture, functions and various algorithms involved. 3. 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.

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. Predicate logic: Interpretations of Predicate Logic Formula – Inference in Predicate Logic. Fuzzy logic: Fuzzy Quantifiers – Fuzzy Inference, Fuzzy rule based system – Defuzzification.	**13**

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

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 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:	18PCS315	**Title**	**Batch :**	2018-2020
		Programming Lab-VI: J2EE Technologies	**Semester**	III
Hrs/Week:	5		**Credits:**	04

Course Objective

On successful completion of the course the students should understand the concepts of Web services, EJB and RMI.

Course Outcomes (CO)

K3	CO1	To implement server side validations with session and database using JDBC
K4	CO2	To analyze web application using Servlet, Java Server Pages and RMI
K5	CO3	To validate Swing components and Servlet lifecycle

JFC Components:

1. Generate a JButton using Swing components
2. Menu Creation using Swing components
3. Implement String Handling concepts
4. Demonstrate JTabbedPane
5. List the structure of JTree
6. Create a JTable using Swing Components.
7. Generate a Progress Bar Swing components
8. Generate a Scroll Pane Swing components
9. Generate a Combo Box Swing components
10. Generate a Radio Button Swing components

Servlet:

11. Demonstrate Generic Servlet.
12. Demonstrate HTTP Servlet
13. Demonstrate Servlet Chaining
14. Demonstrate JDBC Connectivity
15. Demonstrate JDBC using Servlet
16. Demonstrate Cookies.

Bean:

17. Demonstrate Juggler Bean
18. Demonstrate Molecular Bean
19. Implement Simple Property Bean
20. Create a program for Introspection

JSP:

21. Create a JSP program for Fibonacci Series

RMI:

22. Create a RMI Program for Student Mark list

23. Create a RMI Program for Greatest of Two Numbers

Power point Presentations, Brain storming

MAPPING

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	H	S	M	H	S
CO2	H	M	H	H	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: R.Nandhakumar 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:	18PCS316	**Title**	**Batch :**	2018-2020
		Programming Lab-VII : Digital Image Processing using MATLAB	**Semester**	III
Hrs/Week:	5		**Credits:**	04

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:

SEMESTER IV

Programme code:	M.Sc	**Programme Title :**	Master of Computer Science	
Course Code:	18PCS417	**Title**	**Batch :**	2018-2020
		Industrial Project Work and Viva voce (Individual)	**Semester**	IV
Hrs/Week:	-		**Credits:**	08

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 : 160

VIVA VOCE : 40

Contents	**Internal Mark**	**External Mark**	
Project Evaluation	80	80	
Viva voce	20	20	
Grand Total	**100**	**100**	**200**

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:

ELECTIVE I

S.No	SUBJECT CODE	TITLE
1	**18PCS1E1**	**DATA MINING AND WAREHOUSING**
2	18PCS1E2	EMBEDDED SYSTEMS
3	18PCS1E3	MACHINE INTELLIGENCE
4	18PCS1E4	DISTRIBUTED OPERATING SYSTEM

Programme code:	M.Sc	**Programme Title :**	Master of Computer Science	
Course Code:	18PCS1E1	**Title**	**Batch :**	2018-2020
		ELECTIVE- I : Data Mining and Warehousing	**Semester**	I
Hrs/Week:	5		**Credits:**	05

Course Objective

On successful completion of the course the students should understand the concepts of data mining, classification, 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

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. **Partitional 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 aspects of data mart. **Online analytical processing:** Introduction - OLTP & OLAP	**13**

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, 2001, " 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

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:	18PCS1E2	**Title**	**Batch :**	2018-2020
		ELECTIVE- I:	**Semester**	I
Hrs/Week:	5	Embedded Systems	**Credits:**	05

Course Objective

On successful completion of the course the students should understand the different types embedded systems processors and its solutions in programming concepts using C and C++.

Course Outcomes (CO)

K1	CO1	To recollect the mathematical model of the system
K2	CO2	To understand the working of real-time operating systems and real-time database
K3	CO3	To apply real-time algorithm for task scheduling
K4	CO4	To analyze work on design and development of protocols related to real-time communication

CONTENTS	**Hours**
UNIT I **Introduction:** Introduction to Embedded systems, processor in the system, Other hardware units, Software Embedded into a system, Exemplary Embedded Systems, Embedded System-On-Chip(SOC) and in VLSI Circuit. **Processor and Memory Organization:** Structural units in processor, Memory Devices, Memory selection for embedded system, Allocation of memory to program segments and blocks and memory map of a system, direct memory access.	**13**
UNIT II **Devices and Buses for Device Networks:** I/O Devices, Device drivers, Parallel port device drivers in a system, Serial port device drivers in a system, Devices drivers for internal programmable timing devices, Interrupt servicing mechanism, Context and periods for context switching, Deadline and interrupt latency.	**13**
UNIT III **Programming concepts and embedded programming in C and C++:** Software programming in assembly language and in high level language, 'C' program elements :header and source files and preprocessor directives, program elements: macros and functions, program elements : data types, data structures, modifiers, statement, loops and pointers, queues, stacks, list and ordered lists, embedded programming in C++,embedded programming in java, 'c' program compiler and cross-compiler, source code engineering tools for embedded C/C++, optimization of memory needs.	**13**
UNIT IV **Program modeling concepts in single and multiprocessor systems software-development process:** modeling processes for software analysis before software implementation, programming models for event controlled or response time constrained real time programs, modeling of multiprocessor systems. software engineering practices in the	**13**

embedded software development process: software algorithm complexity, software development process life cycle and its models, software analysis, software design, software implementation, software testing, validating and debugging, real time programming issues and during the software development process, *software project management, software maintenance*.	
UNIT V **Inter-process communication and synchronization of processes, tasks and threads:** multiple processes in an application, problem of sharing data by multiple tasks and routines, inter process communication. **Real Time Operating Systems:** operating system services, I/O subsystem, network operating systems, real-time and embedded system operating systems, interrupt routines in RTOS environment: handling of interrupt source call by the RTOS, *RTOS task scheduling models*, interrupt latency and response times of the tasks as performances matrices.	**13**
Total Hours	**65**

**Italicized* texts are for self study

Power point Presentations Seminar ,Quiz, Assignment

Text Books:

1. Raj Kamal, 2008, "Embedded Systems", "Architecture, programming and design", International Editions, Tata McGraw-Hill

Reference Books:

1. Steve Heath, Elsevier, 2003, "Embedded Systems Design", 2nd Edition, Elsevier India Pvt Ltd.,
2. Qing Li & carotene Yao, 2006, "Real Time Concepts for Embedded System", CMP books, New York

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	H	L
CO2	H	M	H	S	H
CO3	L	H	S	M	M
CO4	M	H	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: M. Meena Krithika 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:	18PCS1E3	**Title**	**Batch :**	2018-2020
		ELECTIVE- I :	**Semester**	I
Hrs/Week:	5	Machine Intelligence	**Credits:**	05

Course Objective

On successful completion of the course the students should have to understand the different types of Intelligence problems and its solutions.

Course Outcomes (CO)

K1	CO1	To recollect different types of AI agents
K2	CO2	To understand AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms)
K3	CO3	To apply knowledge representation, reasoning, and machine learning techniques to real-world problems
K4	CO4	To analyze knowledge representation, reasoning, and machine learning techniques to real-world problems

CONTENTS	**Hours**
UNIT I **Introduction:** Introduction to AI-History of AI-Intelligent Agents- Agents and Environment-Good Behavior: Concept of Rationality-The nature of Environments- the Structure of Agents. Solving problems by searching-Example problems-searching for solutions-*Uninformed search strategies*-Searching with partial Information.	**13**
UNIT II **Informed search and exploration:** Informed search strategies-Heuristic functions-Local search algorithms and optimization problems-local search in continuous spaces-Constraint satisfaction problems-backtracking search for CSPs-local search for constraint satisfaction problems-The structure of problems-Adversarial search-games-*optimal decisions in games*-Alpha beta pruning-Imperfect, real-time Decisions.	**13**
UNIT III **Knowledge Representation:** first order logic (FOL) –Syntax and semantics of FOL – Using FOL- Knowledge Engineering in FOL-Inference in FOL-Propositional Vs first order inference- Unification and Lifting-Forward chaining-backward chaining-categories and objects-actions –situations-Events.	**13**
UNIT IV **Learning:** Learning from Observations-forms of learning-Inductive learning-learning decision trees-Ensemble Learning-Knowledge in learning-Logical formulation of learning – knowledge in learning-Explanation based learning-learning using relevance information-Inductive logical programming.	**13**
UNIT V **Communication:** Communication as action –A formal grammar for fragment of English-	**13**

Syntactic Analysis-Augmented Grammars-Semantic Interpretation-Ambiguity and disambiguation –discourse understanding-Grammar Induction.	
Total Hours	**65**

**Italicized* texts are for self study

Power point Presentations, Group discussions, Seminar , Assignment

Text Books:

1. Stuart Russel, Peter Norwig, 2002, "Artificial Intelligence – A modern approach", 2nd Edition, Pearson Education

Reference Books:

1. Elaine Rich, Kevin Knight, 2003, "Artificial Intelligence", 2nd Edition, Tata McGrawHill
2. Paterson. D.W., 1990, "Introduction to Artificial Intelligence and Expert Systems", 2nd Edition, Prentice Hall Of India

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	H	S
CO2	H	M	H	L	H
CO3	M	S	S	M	M
CO4	H	H	H	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: 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:	18PCS1E4	**Title**	**Batch :**	2018-2020
		ELECTIVE- I:	**Semester**	I
Hrs/Week:	5	Distributed Operating System	**Credits:**	05

Course Objective

On successful completion of the course the students should understand the concepts of Operating System, Inter-process communication and distributed Operating System.

Course Outcomes (CO)

K1	CO1	To remember scheduling in distributed operating systems, fault tolerance, real-time distributed systems, and designing of distributed file systems
K2	CO2	To understand the hardware and software concepts of distributed operating systems, various design issues like transparency, flexibility etc.,
K3	CO3	To apply concept of design and implementation in the context of distributed operating systems
K4	CO4	To interpret design and development of distributed systems and distributed systems applications

CONTENTS	**Hours**
UNIT I **Distributed Computer Operating System Fundamentals:** What is a Distributed Computing System-Evolution of Distributed Computing Systems- *Distributed Commuting System Models*-Why is Distributed Computing System Gaining Popularity - What is a Distributed Operating System - Introduction to DCE-Creation-Components-Cells. **Network types:** LAN Technologies- WAN Technologies- Communication protocols-Internetworking.	**13**
UNIT II **Message Passing:** Introduction- Desirable Features of a Good Message Passing system-Issues in IPC by message passing- Synchronization- Buffering- Multidatagram Messages - Encoding and Decoding of Message Data- Process Addressing- Failure Handling- Group Communication.	**13**
UNIT III **Remote Procedure Calls:** Introduction- The RPC Model- Transparency of RPC-Implementing RPC Mechanism- Stub Generation- RPC Messages- Marshaling Arguments and Results- Server Management- Parameter-*Passing Semantics*- Call Semantics-Communication Protocols for RPCs- Complicated RPCs-Client-Server Binding. **Distributed Shared Memory:** Introduction- General Architecture of DSM System-Design and *Implementation Issues of DSM*- Granularity- Structure of Shared Memory Space- Replacement Strategy.	**13**
UNIT IV **Synchronization:** Introduction- Clock Synchronization: How computer clocks are implemented-Drifting of clocks-Mutual Exclusion-Election Algorithms: Bully algorithm-	**13**

Ring algorithm. **Process Management:** Introduction- Process Migration: Features-Mechanisms-Heterogeneous systems-Advantages- Threads: Motivations-Models-issues-implementation.	
UNIT V **Distributed File Systems:** Introduction- Desirable Features of a Good Distributed File System- File Models- File-Accessing Models- File-Sharing Semantics- File-Caching Schemes- Design Principles. **Case Studies:** Introduction-Amoeba-V-System-Mach-Chorus-A Comparison of Amoeba, V-System, Mach and Chorus.	**13**
Total Hours	**65**

**Italicized* texts are for self study

Power point Presentations, Seminar, Assignment

Text Books:

1. Pradeep k. Sinha, 2000, "Distributed Operating Systems Concepts and Design", 3rd edition, PHI publications

Reference Books:

1. James L. Peterson & Silberschatz.A, 2001, "Operating System Concepts", World Student Edition, 2nd Edition , Addison Wesley
2. Andrew S. Tenenbaum, 2015, "Modern Operating Systems", 4th edition, Prentice Hall
3. Dietel H.M., 2000, "An Introduction to Operating Systems", World Student Edition, Addison Wesley

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MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	H	S
CO2	H	H	H	S	H
CO3	M	S	S	M	M
CO4	M	H	H	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:R. Deepa Signature:	Name: Dr.M. Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature:

ELECTIVE II

S.No	SUBJECT CODE	TITLE
1	**18PCS2E1**	COMPUTING TECHNOLOGIES
2	18PCS2E2	SATELLITE COMMUNICATION
3	18PCS2E3	ANTENNAS AND PROPAGATION
4	18PCS2E4	REMOTE SENSING AND SENSORS

Programme code:	M.Sc	**Programme Title :**	Master of Computer Science	
Course Code:	18PCS2E1	**Title**	**Batch :**	2018-2020
		ELECTIVE- II:	**Semester**	II
Hrs/Week:	5	Computing Technologies	**Credits:**	05

Course Objective

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

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

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 **Grid computing:** Open Grid Services Architecture (OGSA) – Sample Use Cases that drive the OGSA –	**13**

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

Reference Books

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

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 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:	18PCS2E2	**Title**	**Batch :**	2018-2020
		ELECTIVE- II :	**Semester**	II
Hrs/Week:	5	Satellite Communication	**Credits:**	05

Course Objective

On successful completion of the course the students should understand the concepts of satellites and satellite services.

Course Outcomes (CO)

K1	CO1	To recollect application of techniques, tools and resources
K2	CO2	To understand applications of established communication methods to complex engineering problem solving
K3	CO3	To apply problem solving approaches to work challenges and make decisions using sound engineering methodologies
K4	CO4	To analyze High levels of technical competence in the field

CONTENTS	**Hours**
UNIT I **Satellite Orbits :** Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits – Look Angle Determination- Limits of visibility –eclipse-Sub satellite point –Sun transit outage-Launching Procedures - launch vehicles and propulsion.	**13**
UNIT II **Space Segment And Satellite Link Design:** Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command. Satellite uplink and downlink Analysis and Design, link budget, E/N calculation- performance impairments-system noise, inter modulation and interference, Propagation Characteristics and Frequency considerations- System reliability and design lifetime.	**13**
UNIT III **Satellite Access:** Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Brocast, multiple access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication, compression – encryption.	**13**
UNIT IV **Earth Segment:** Earth Station Technology-- Terrestrial Interface, Transmitter and Receiver, Antenna Systems TVRO, MATV, CATV, Test Equipment Measurements on G/T, C/No, EIRP, Antenna Gain.	**13**
UNIT V **Satellite Applications:** INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM,	**13**

GPS, INMARSAT, LEO, MEO, and Satellite Navigational System. Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Digital audio broadcast (DAB)- Worldspace services, Business TV(BTV), GRAMSAT, Specialized services – *E –mail, Video conferencing, Internet*.	
Total Hours	**65**

**Italicized* texts are for self study

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

Text Books:

1. Dennis Roddy, 'Satellite Communication', McGraw Hill International, 4th Edition, 2006
2. Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, 'Satellite Communication Systems Engineering', Prentice Hall/Pearson, 2007

Reference Books:

1. N.Agarwal, 'Design of Geosynchronous Space Craft, Prentice Hall, 1986
2. Bruce R. Elbert, 'The Satellite Communication Applications' Hand Book, Artech HouseBostan London, 1997
3. Tri T. Ha, 'Digital Satellite Communication', II edition, 1990.

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MAPPING

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	H	M	H	S
CO2	H	M	H	S	L
CO3	S	S	S	M	M
CO4	L	H	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: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:	18PCS2E3	**Title**	**Batch :**	2018-2020
		ELECTIVE- II :	**Semester**	II
Hrs/Week:	5	Antennas and Propagation	**Credits:**	05

Course Objective

On successful completion of the course the students should understand the concepts of Antennas and its propagation.

Course Outcomes (CO)

K1	CO1	To recollect fundamental antennas and propagation parameters and its terminology
K2	CO2	To understand the basic concepts of electromagnetic wave radiation and reception
K3	CO3	To apply the fundamentals to design different types of antennas
K4	CO4	To analyze the basic skills necessary for designing a wide variety of practical antennas and antenna arrays

CONTENTS	**Hours**
UNIT I **Antenna Basics:** Introduction, basic Antenna parameters, patterns, beam area, radiation intensity, beam efficiency, diversity and gain, antenna apertures, effective height, bandwidth, radiation, efficiency, antenna temperature and antenna filed zones.	**13**
UNIT II **Point Sources and Arrays:** Introduction, point sources, power patterns, power theorem, radiation intensity, filed patterns, phase patterns. Array of two isotropic point sources, non-isotropic but similar point sources, principles of pattern multiplication, examples of pattern synthesis by pattern multiplication, non-isotropic point sources, broad side array with non unipolar amplitude distribution, broad side versus end fire array, direction of maxima fire arrays of n isotropic point sources of equal amplitude and spacing.	**13**
UNIT III **Electric Dipoles And Thin Linear Antennas:** Introduction, short electric dipole, fields of a short dipole, radiation resistance of short dipole, radiation resistances of lambda/2 Antenna, thin linear antenna, micro strip arrays, low side lobe arrays, long wire antenna, folded dipole antennas.	**13**
UNIT IV **Loop, Slot, Patch And Horn Antenna:** Introduction, small loop, comparison of far fields of small loop and short dipole, loop antenna general case, far field patterns of circular loop, radiation resistance, directivity, slot antenna, Balinet's principle and complementary antennas, *impedance of complementary and slot antennas, patch antennas, horn antennas, rectangular horn antennas.*	**13**
UNIT V **Antenna Types:** Helical Antenna, Yagi-Uda array, corner reflectors, parabolic reflectors, log periodic antenna, lens antenna, antenna for special applications – sleeve antenna, turnstile antenna, omni directional antennas, antennas for satellite antennas for ground penetrating radars, embedded antennas, ultra wide band antennas, plasma antenna.	**13**
Total Hours	**65**
**Italicized* texts are for self study	

Power point Presentations, Seminar , Brain storming

Text Books:

1. Harish and Sachidananda, 2007, "Antennas and Wave Propagation" Oxford Press

Reference Books:

1. Balanis.C.A, 1997, "Antenna Theory Analysis and Design", 2nd Edition, John Wiley
2. Sineon. R.Saunders, 2003, "Antennas and Propagation for Wireless Communication Systems", John Wiley

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	H	S
CO2	H	M	H	S	H
CO3	M	S	S	M	M
CO4	M	H	H	L	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: P. Jayapriya 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:	18PCS2E4	**Title**	**Batch :**	2018-2020
		ELECTIVE- II:	**Semester**	II
Hrs/Week:	5	Remote Sensing and Sensors	**Credits:**	05

Course Objective

On successful completion of the course the students should understand the concepts of remote sensing and sensors.

Course Outcomes (CO)

K1	CO1	To remember and explain at a basic level fundamental physical principles of remote sensing, including the electromagnetic spectrum; the emission, scattering, reflection, and absorption of electromagnetic (EM) radiation
K2	CO2	To understand key applications of land, marine, aquatic, and atmospheric remote sensing and relate them to the properties of historical, current, and planned remote sensing instruments, approaches, and datasets
K3	CO3	To apply mathematical relationships (at a pre-calculus level) describing fundamental physical, geometric, and computational principles relevant to remote sensing
K4	CO4	To analyze proficiency and conceptual understanding in using software or manual techniques to carry out remote sensing image processing and analysis through a series of laboratory exercises and reports

CONTENTS	**Hours**
UNIT I **Basics of Remote Sensing:** Principles of remote sensing, History of Remote sensing, remote sensing in India, *Electromagnetic Radiation and Electromagnetic Spectrum.* **EMR quantities:** Nomenclature and Units, Thermal Emission of Radiation, Radiation Principles (Plank's Law, Stephen Boltezman law), Interaction of EMR with the Earth Surface (Wien's displacement law, Kirchoffs Law), Spectral signature, Reflectance characteristics of Earths cover types, Remote sensing systems.	**13**
UNIT II **Platforms and sensors:** Platforms, Remote sensing sensors, resolutions Across track and along the track scanning, Optical sensors, Thermal scanners, Microwave sensing radar, satellite missions, Landsat series, SPOT series, IRS satellite series, IKNOS.	**13**
UNIT III **Microwave Remote Sensing:** Airborne and Space borne radar systems basic instrumentation. System parameters - *Wave length, Polarization, Resolutions, Radar geometry, Target parameters* - Back scattering, Point target, Volume scattering, Penetration, Reflection, Bragg resonance, Cross swath variation. Speckie radiometric calibration: Radar - Grametry - Introduction, Mosaicing Stereoscope. **Application:** Geology, Forestry, Land use, Soils etc. Future trends and Research.	**13**
UNIT IV **Thermal Imaging system:** Introduction - IR region of the Electromagnetic spectrum, Atmospheric transmission, Kinetic and radiant temperature, Thermal properties of materials,	**13**

Emissivity, Radiant temperature. Thermal conductivity. Thermal capacity, thermal inertia, apparent thermal inertia, Thermal diffusivity. IR - radiometers, Airborne and Satellite TTR scanner system, Characteristics of IR imagesi) Scanner distortion, ii) image irregularities, iii) Film density and recorded iv)Temperature ranges **Effects of weather on images:** i) Clouds, ii) Surface winds, iii) Penetration of smoke plumes, Interpretation of thermal imagery, Advantages of Thermal imagery.	
UNIT V **Meteorological satellites:** Meteorological satellite characteristics and their orbits, TIROS, NIMBUS, NOAA, TIROS N, SEASAT, GOES, METEOSAT, INSAT, Measurement of Earth and Atmospheric energy and Radiation budget parameters from satellites.	**13**
Total Hours	**65**

**Italicized* texts are for self study

Power point Presentations, Seminar , Assignment

Text Books:

1. Travelt.W, "Imaging Radar for Resource Survey: Remote Sensing Applications", 3rd Edition, Chapman & Hall
2. Davis.S.M, Swain.P.H, "Remote Sensing: The quantitative approach", McGraw Hill

Reference Books:

1. Barrett. E.C, Curtis.L.F, " Introduction to Environmental Remote Sensing", Chapman and Hall, London
2. Floyd, F. Sabins, 1978 , "Remote Sensing Principles and Interpretation", Freeman and Co., San Franscisco.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	S	H	S
CO2	S	H	H	M	L
CO3	H	M	L	H	M
CO4	H	H	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: Dr. A. Kanagaraj Signature:	Name: Dr.M. Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature:

ELECTIVE III

S.No	SUBJECT CODE	TITLE
1	**18PCS3E1**	**SOFT COMPUTING**
2	18PCS3E2	MACHINE LEARNING
3	18PCS3E3	TELECOMMUNICATION SYSTEMS
4	18PCS3E4	PARALLEL COMPUTING

Programme code:	M.Sc	**Programme Title :**	Master of Computer Science	
Course Code:	18PCS3E1	**Title**	**Batch :**	2018-2020
		ELECTIVE – III : Soft	**Semester**	III
Hrs/Week:	5	Computing	**Credits:**	05

Course Objective

On successful completion of the course the students should understand the concepts of Neural Networks, architecture, functions and various algorithms involved. 3. 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.

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	**13**

propositional Logic. 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

2. 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

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 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:	18PCS3E2	**Title**	**Batch :**	2018-2020
		ELECTIVE – III: Machine Learning	**Semester**	III
Hrs/Week:	5		**Credits:**	05

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

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. Soren Brunak, Pierre F Baldi, "Bioinformatics: The Machine Learning approach", MIT Press, 2001.
2. Balas Kausik Natarajan, "Machine Learning: A Theoretical Approach", Morgan Kaufmann, 1991.

Reference Books:

1. Steffen Schulze-Kremer, "Molecular Bioinformatics: Algorithms and Applications", Walter de Gruyter, 1996.
2. Yi-Ping Phoebe. Chen, "Bioinformatics Technologies", Springer, 2005.
3. Zheng Rong Yang, "Machine Learning Approaches to Bioinformatics" (Science, Engineering, and Biology Informatics), World Scientific Publishing Company; 1 edition 2010.

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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

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:	18PCS3E3	**Title**	**Batch :**	2018-2020
		ELECTIVE – III:	**Semester**	III
Hrs/Week:	5	Telecommunication Systems	**Credits:**	05

Course Objective

On successful completion of the course the students have basic understanding of the concepts and principles of optical fibre communications, line transmission systems, satellite communication systems, public switched telephone networks, teletraffic theory, digital transmission system standards, network planning and principle of digital switching systems.

Course Outcomes (CO)

K1	CO1	To remember the concepts and principles of optical fibre communications, line transmission systems, satellite communication systems.
K2	CO2	To understand how to manage public switched telephone networks, teletraffic theory, digital transmission system standards, network planning and principle of digital switching systems.
K3	CO3	To deploy measurements and experiments in laboratory on actual components, devices, equipment and systems in telecommunications
K4	CO4	To interpret communication equipment for the technical functionality.

CONTENTS	**Hours**
UNIT I PSTN TECHNOLOGY Introduction: History of telecommunications – various networks used to transmit voice, video and data signals – media used to convey telecommunication signals – basics of the three major voice communication technologies – basics of PC- based voice communication systems (CTI) – basics of LAN & WAN – telecommunication standards. PSTN Technology: Difference between simplex, half-duplex and duplex transmissions – basic understanding of telephone set – history and evolution of Central Exchange Switching – Operator Switch Boards (PBX) – intraoffice and interoffice calls – Extended Area Service (EAS) – circuit switching, packet switching & TDM switching – DTMF signaling – dial register – in-band & out-of- band signaling.	**13**
UNIT II CUSTOMER-PROVIDED EQUIPMENTS - Working of telephone – sidetone – ringers – DTMF dial – feature phone, proprietary telephone, hands-free phone, speaker phones, ISDN telephones – key systems – CBXs – private-in-line network and a software-defined network – station features – Telecommunication Application Program Interface (TAPI).	**13**
UNIT III ELECTRONICS FOR TELECOMMUNICATIONS - Multiplexing: TDM – FDM – AM technology – WDM & DWDM – PAM & PCM - TDM using PAM & PCM – STDM – various levels of SONET – DS0 & DS1 systems. Analog & Digital signals: Characteristics of analog and digital signals – conversion of analog voice signal into a digital signal – conversion of PSTN into a digital network – digital data coding techniques – bandwidth vs power loss.	**13**
UNIT IV	**13**

DATA COMMUNICATIONS & NETWORKING - Data Communications: Various ways to connect DTE & DCE – serial vs parallel transmission – UART, baud rates and MODEM – asynchronous vs synchronous transmission – error detection & error correction techniques – SS7 networks – ISDN – ADSL. *Data Networking*: LANs & LAN architectures – OSI model – bridged LAN – LAN medium – NIC – packets, frames – PSN – STDM – PDN – Packet Assembler/Disassembler – switched vitual circuit vs permanent virtual circuit – X.25 packet network – LAPB – frame relay – ATM, Voice-Over ATM.	
UNIT V MOBILES PHONES AND WIRELESS COMMUNICATIONS - Mobile Phones: Evolution of mobile telephone technology – DAMPS vs GSM vs CDMA – PCS Networks. Wireless Communication: Analog & Digital access – WAP, WLANs, Microwave LANs, radio LANs, infrared LANs, WLL technologies – Satellite communications – satellite earth station – geosynchronous satellite, LEO & MEO satellites – *international wireless communication systems*.	**13**
Total Hours	**65**

**Italicized* texts are for self study

Power point Presentations, Seminar , Assignment

Text Books:

1. Marion Cole, "Introduction to Telecommunications: Voice, Data and Internet", Pearson Education,
   2nd edition, 2008.
2. Anu A. Gokhale, "Introduction to Telecommunications", Delmar, 2nd edition, 2005.

Reference Books:

1. Pete Moulton, Jason Moulton, "The Telecommunication Survival Guide", Pearson Education, 2001.
2. Roger L. Freeman, "Telecommunication System Engineering", Wiley-India, 4th edition, 2004.

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

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 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:	18PCS3E4	**Title**	**Batch :**	2018-2020
		ELECTIVE – III : Parallel Computing	**Semester**	III
Hrs/Week:	5		**Credits:**	05

Course Objective

The objective of this course is to make student aware of entirely new paradigm of parallel programming and computing.

Course Outcomes (CO)

K1	CO1	To recollect critical methods and techniques related to parallel computing.
K2	CO2	To understand the optimization of serial programs and algorithms within computational science.
K3	CO3	Apply hardware, algorithm, and programming of parallel systems
K4	CO4	To analyze how large-scale parallel systems are architectured and how massive parallelism are implemented in accelerator architectures

CONTENTS	**Hours**
UNIT I Introduction to Parallel Computing: Motivating Parallelism, The Computational Power Argument - from Transistors to FLOPS, The Memory/Disk Speed Argument, The Data Communication Argument, Scope of Parallel Computing, Applications in Engineering and Design, Scientific Applications, Commercial Applications, Applications in Computer Systems, Organization and Contents of the Text, Parallel Programming Platforms: Implicit Parallelism: Trends in Microprocessor Architectures, Pipe lining and Superscalar Execution, Very Long Instruction Word Processors, Limitations of Memory System Performance, Improving Effective Memory Latency Using Caches, Impact of Memory Bandwidth, Alternate Approaches for Hiding Memory Latency, Tradeoffs of Multithreading and Prefetchin, Dichotomy of Parallel Computing Platforms, Control Structure of Parallel Platforms, Communication Model of Parallel Platforms, Physical Organization of Parallel Platforms, Architecture of an Ideal Parallel Computer, *Interconnection Networks for Parallel Computers*, Network Topologies, Evaluating Static Interconnection Networks.	**13**
UNIT II Principles of Parallel Algorithm Design: Preliminaries, Decomposition, Tasks, and Dependency Graphs, Granularity, Concurrency, and Task-Interaction, Processes and Mapping, Processes versus Processors, Decomposition Techniques, Recursive Decomposition, Data Decomposition, Exploratory Decomposition, Speculative Decomposition, Hybrid Decompositions, Characteristics of Tasks and Interactions, Characteristics of Tasks, Characteristics of Inter-Task Interactions, Mapping Te chniques for Load Balancing, Schemes for Static Mapping, Schemes for Dynamic	**13**

Mapping, Methods for Containing Interaction Overheads, Maximizing Data Locality, Minimizing Contention and Hot Spots, Overlapping Computations with Interactions, Replicating Data or Computations, Using Optimized Collective Interaction Operations, Overlapping Interactions with Other Interactions, Parallel Algorithm Models.	
UNIT III Analytical Modeling of Parallel Programs: Performance Metrics for Parallel Systems, Execution Time, Total Parallel Overhead , Speedup , Efficiency , Cost , The Effect of Granularity on Performance, Scalability of Parallel Systems, Scaling Characteristics of Parallel Programs, The Isoefficiency Metric of Scalability, Cost – Optimality and the Isoefficiency Function, A Lower Bound on the Isoefficiency Function, The Degree of Concurrency and the Isoefficiency Function, Minimum Execution Time and Minimum Cost-Optimal Execution Time, Asymptotic Analysis of Parallel Programs, Other Scalability Metrics.	**13**
UNIT IV Programming Shared Address Space Platforms: *Thread Basics*, Why Threads? The POSIX Thread API, Thread Basics: Creation and Termination, Synchronization Primitives in Pthrea ds, Mutual Exclusionfor Shared Variables, Condition Variables for Synchronization, Controlling Thread and Synchronization Attributes , Attributes Objectsfor Threads , Attributes Objects for Mutexe, Thread Cancellation, Composite Synchronization Constructs, Read-Write Locks, Barriers, Tips for Designing Asynchronous Programs, OpenMP: a Standard for Directive Based Parallel Programming, The OpenMP Programming Model, Specifying Concurrent Tasks in OpenMP, Synchronization Constructs in OpenMP, Data Handling in OpenMP, OpenMP Library Functions, Environment Variables in OpenMP, Explicit Threads versus OpenMP Based Programming.	**13**
UNIT V Programming: Overview of Dynamic Programming, Serial Monadic DP Formulations, The Shortest -Path Problem, The Oil Knapsack Problem, Nonserial Monadic DP Formulations, The Longest-Common- Subsequence Problem, Serial Polyadic DP Formulations, Floyd's All-Pairs Shortest-Paths Algorithm, Non serial Polyadic DP Formulations, The Optimal Matrix-Parenthesization Problem, Fast Fourier Transform: The Serial Algorithm, The Binary - Exchange Algorithm, A Full Bandwidth Network, Limited Bandwidth Network, Extra Computations in Parallel FFT, The Transpose Algorithm, Two-Dimensional Transpose Algorithm, The Generalized Transpose Algorithm .	**13**
Total Hours	**65**
**Italicized* texts are for self study	
Power point Presentations, Seminar, Assignment	
Text Books: 1. Introduction to Parallel Computing, AnanthGrama, Pearson Education.	
Reference Books: **1.** Fundamental of Paralle Processing, Harry F. Jordan, Gita Alaghband, Pearson Education.	

2. Parallel Programming, Michael Allen, Barry Wilkinson, Pearson Education.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	H	S
CO2	H	M	H	S	H
CO3	M	S	S	M	M
CO4	M	H	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: S.S.Shanthi Signature:	Name: Dr.M. Sakthi Signature:	Name: Dr. M. Durairaju Signature:	Name: Dr. R. Muthukumaran Signature: