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 2016-2018

Part	Subject Code	Title of the Paper	Hours	Exam Duration Hours	Max. Marks			Credits
					Internal	External	Total	
I SEMESTER								
III	16PCS101	Core I - Object Oriented Software Engineering	5	3	25	75	100	5
	16PCS102	Core II - Design and Analysis of Computer Algorithms	5	3	25	75	100	4
	16PCS103	Core III - Information Security	5	3	25	75	100	4
	16PCS1E1	Core Elective-I Data Mining and Warehousing	5	3	25	75	100	5
	16PCS104	Core Lab - I: UML	5	3	40	60	100	4
	16PCS105	Core Lab - II : Design and Analysis of Computer Algorithms	5	3	40	60	100	4
Total							**600**	**26**
II SEMESTER								
III	16PCS206	Core IV - Open Source and Computing Tools	4	3	25	75	100	4
	16PCS207	Core V - Advanced Networks	4	3	25	75	100	5
	16PCS208	Core VI - Big Data Analytics	5	3	25	75	100	4
	16PCS2E2	Core Elective - II Geographic Information and Global Positioning Systems	5	3	25	75	100	5
IV	16PCS2N1 16PCS2N2	Non Major Elective: Networks/Client-Server Technology	1	3	-	100	100	2
III	16PCS209	Core Lab -III : Open Source and Computing Tools Lab	5	3	40	60	100	4
	16PCS210	Core Lab-IV : Networks	5	3	40	60	100	4
Total							**700**	**28**

III SEMESTER								
III	16PCS311	J2EE Technologies	4	3	25	75	100	4
	16PCS312	Digital Image Processing	5	3	25	75	100	5
	16PCS313	Computing Technologies	4	3	25	75	100	4
	16PCS3E3	Elective-III Enterprise Resource Planning	5	3	25	75	100	5
	16PCS314	Programming Lab-V : J2EE Technologies	5	3	40	60	100	4
	16PCS315	Programming Lab-VI: Digital Image Processing Lab	5	3	40	60	100	4
	16PCS316	Pilot Project-I	2	-	20	80	100	2
Total							**700**	**28**
IV SEMESTER								
III	16PCS417	Industrial Project Work and Viva –Voce (Individual)	-	-	40	160	200	8
Total							**200**	**8**
Grand Total							**2200**	**90**

SEMESTER I

Department	**Computer Science**		
Course	**M.Sc.**	**Effective from the Year: 2016-2018**	
Subject Code: 16PCS101	**Title:** Object Oriented Software Engineering	**Semester:** I	
Hrs/Week	5	**Credit:** 5	
Objectives	On successful completion of the course the students should understand the concept of object oriented analysis and design has emerged as a new paradigm of analysis and design of the systems. This subject is designed to help in learning object oriented analysis and design concepts.		
UNITS	**Contents**		**Hrs**
Unit I	**Object Oriented Systems Development Life Cycle:** Introduction – The software development process – building high-quality software. **Object Oriented Methodologies:** Introduction: Toward Unification – Too many methodologies – Survey of some of the Object Oriented Methodologies – Rumbaugh Object Modeling Technique – The Booch Methodology – The Jacobson Methodologies.		**13**
Unit II	**UML Diagrams:** Class diagrams – Object diagrams – Components – Use Cases – Activity Diagrams – State diagrams – Deployment – Collaborations – Deployment. **Note: Concepts with examples only.**		**13**
Unit III	**The Software Process:** A generic view of process – Prescriptive models- The waterfall model-Incremental process model-Evolutionary process models-Specialized process model- Unified process-An agile view of process- Agile- Agile process-Agile process models.		**13**
Unit IV	**Analysis Model**: Requirement analysis-Analysis modeling approaches- Data modeling concepts- Object oriented analysis- Scenario based modeling- Flow oriented modeling- Class based modeling- Creating behavioral model. **Design Engineering:** Design within the context of software engineering- Design process and design quality- Design concepts- Design model- Pattern based software design.		**13**
Unit V	**Web Engineering Components And Models :**Web Engineering – Framework-Components-Modeling Analysis – Modeling for Web Applications: Content Model-Interaction Model-Function Model- Configuration Model-Case Studies.		**13**
Total Contact Hrs			**65**
Text Books	1. Grady Booch , 2007 , "Object Oriented Analysis and Design", 3rd edition, Pearson (Unit I) 2. Grady Booch, James Raumbaugh and Ivar Jacobson, 2008, "The Unified Modeling Language User Guide" , 2nd Edition, Pearson (Unit II) 3. Roger S. Pressman , 1997, "Software Engineering", 6th Edition, McGraw-Hill (Unit III, IV) 4. Gerti Kappel, Brigit Proll, Siegfried Reich, Werner Retschitzegger, 2006, "Web Engineering", John Wiley &Sons Ltd., (Unit V)		
Reference Books	1. Bernd Bruegge, Allen H. Dutoit, 2004, "Object Oriented Software Engineering using UML, Patterns and Java", 2nd Edition, Pearson 2. Craig Larman, 2002 , "Applying UML and Patterns", 2nd Edition, Pearson		

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N.Yasodha		M.Sakthi		

Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS102	**Title:** Design and Analysis of Computer Algorithms	**Semester:** I
Hrs/Week	5	**Credit:** 4
Objectives	On successful completion of the course the students should understand the various design and analysis of the algorithms.	

UNITS	**Contents**	**Hrs**
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.	**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 Contact Hrs		**65**

Text Books	1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2008, "Computer Algorithms", 2nd Edition, Galgotia Publications
Reference Books	1. Ellis Horrowitz, Sartaj Sahni, 2008, "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, 2001, "Data Structures and Algorithms in C++", 4th Edition, Vikas publishing house, NewDelhi

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Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS103	**Title:** Information Security	**Semester:** I
Hrs/Week	5	**Credit:** 4
Objectives	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.	

UNITS	**Contents**	**Hrs**
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**
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

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ELECTIVE - I

Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS1E1	**Title: ELECTIVE- I** Data Mining and Warehousing	**Semester:** I
Hrs/Week	5	**Credit:** 5
Objectives	On successful completion of the course the students should understand the classification, clustering techniques and data warehousing.	

UNITS	**Contents**	**Hrs**
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 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.**	**13**
Total Contact Hrs		**65**

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", 3nd 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.,

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Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS104	**Title:** Core Lab-I: UML	**Semester:** I
Hrs/Week	5	**Credit:** 4
Objectives	On successful completion of the course the students should understand the concepts of UML Diagrams.	

Create a UML diagrams for the following applications.

1. Single sign-on to Google Application
2. Banking system
3. ATM Processing System
4. Quiz system
5. Student information system
6. Gas agency
7. Tourism and travel management system
8. Online shopping Domain
9. Construction management system
10. Library domain model
11. Inventory management system
12. payroll processing system
13. Hotel management system
14. Ration shop management system
15. Real estate

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

Total Contact Hrs	**65**

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Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS105	**Title:** Core Lab-II: Design and Analysis of Computer Algorithms	**Semester:** I
Hrs/Week	5	**Credit:** 4
Objectives	On successful completion of the course the students should understand the concepts of data structures.	

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

Total Contact Hrs	**65**

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SEMESTER II

Department	**Computer Science**		
Course	**M.Sc.**	**Effective from the Year: 2016-2018**	
Subject Code: 16PCS206	**Title:** Open Source and Computing Tools	**Semester:** II	
Hrs/Week	4	**Credit:** 4	
Objectives	On successful completion of the course the students should have gained knowledge in .Net framework, PHP Programming, MySql, Apache and Linux.		
UNITS	**Contents**		**Hrs**
Unit I	**DOTNET Framework** -Introduction to DOTNET- DOT NET class framework- Common Language Runtime- Overview- Elements of .NET application - Memory Management- Garbage Collector : Faster Memory allocation ,Optimizations- Common Language Integration- Common type system Reflection API- User and Program Interface VB.NET: Control flow –conditional statements-Loops-methods**.**		**10**
Unit II	**ASP.NET Controls:** Overview of dynamic web page, introduction & features of ASP.NET, understanding ASP.NET controls, applications. Web forms, web form controls, server controls, client controls, adding controls to web form, buttons, text box, labels, checkbox, radio buttons, list box. Adding controls a runtime, Running a web application, creating a multiform web project, Form validation: client side and server side validation, Validation controls: required field comparison range, Calendar control, Ad rotator control.		**11**
Unit III	**Open source:** Introduction - Open Source – Open Source vs. Commercial Software – What is Linux? - Free Software – Where I can use Linux? Linux Kernel – Linux Distributions - Linux Essential Commands – File system Concept - Standard Files - The Linux Security Model - Vi Editor - Partitions creation - Shell Introduction - String Processing - Investigating and Managing Processes - Network Clients - Installing Application.		**10**
Unit IV	**Apache:** Introduction - Apache Explained - Starting, Stopping, and Restarting Apache - Modifying the Default Configuration - Securing Apache - Set User and Group - Consider Allowing Access to Local Documentation - Don't Allow public_html Web sites - Apache control with .htaccess **MySQL:** Introduction to MY SQL - The Show Databases and Table - The USE command - Create Database and Tables - Describe Table - Select, Insert, Update, and Delete statement - Some Administrative detail - Table Joins - Loading and Dumping a Database.		**11**
Unit V	**PHP:** PHP Introduction- General Syntactic Characteristics - PHP Scripting - Commenting your code - Primitives, Operations and Expressions - PHP Variables - Operations and Expressions Control Statement - Array - Functions - Basic Form Processing - File and Folder Access - Cookies - Sessions - Database Access with PHP - MySQL - MySQL Functions - Inserting Records - Selecting Records - Deleting Records - Update Records.		**10**
Total Contact Hrs			**52**
Text Books	1. Jeffrey R. Shapiro, 2002, "VB.NET Complete Reference", Tata McGraw-Hill Publication Edition 2. Dave Mercer, 2002, "ASP.NET: A Beginner's Guide", Tata McGraw-Hill Publication Company Limited 3. James Lee and Brent Ware, 2008, "Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP", Dorling Kindersley(India) Pvt. Ltd.,		
Reference Book	1. Eric Rosebrock, Eric Filson, 2004, "Setting up LAMP: Getting Linux, Apache, MySQL, and PHP and working Together", Published by John Wiley and Sons		

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T.Menaka		M.Sakthi		

Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS207	**Title:** Advanced Networks	**Semester:** II
Hrs/Week	4	**Credit:** 5
Objectives	On successful completion of the course the students should gain in-depth knowledge of Internet protocols and their functionalities.	

UNITS	**Contents**	**Hrs**
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. **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.	**10**

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 Contact Hrs		**52**
Text Book	1. Douglas E. Comer, 2010, "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	

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R.Nandhakumar		M.Sakthi		

Department	**Computer Science**		
Course	**M.Sc.**	**Effective from the Year: 2016-2018**	
Subject Code: 16PCS208	**Title:** Big Data Analytics	**Semester:** II	
Hrs/Week	5	**Credit:** 4	
Objectives	On successful completion of the course students should understand about big data, its architecture, the concept of Hadoop and Map reduce functions.		
UNITS	**Contents**		**Hrs**
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.		**13**
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.		**13**
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.		**13**
Unit IV	**Appliances and Big Data Warehouse**: Integrating Big Data with Traditional Data Warehouse – Big Data Analysis and Data Datawarehouse – Changing the role of Data Warehouse – Changing Deployment Models to the Big Data Era – Future of Data Warehouse. **Defining Big Data Analytics:** Using Big Data to get results – Modifying BI products to handle Big Data – Big Data Analytics Examples. **Integrating Data Sources**: Identifying the data – Fundamentals of Big Data Integration – Defining Traditional ETL – Understanding ELT – Prioritizing Big Data Quality – Using Hadoop as ETL – Best practices for Data Integration in a Big Data World.		**13**
Unit V	**Importance of Big Data to business:** Big Data as a Business planning Tool-Adding new Dimensions to the planning cycle – Keeping data analytics in perspective – Getting Started with the right Foundation – Getting the Big data Strategy started-Planning for Big Data – Transforming Business Processes with Big Data. Ten Big Data Best Practices – Ten Big Data Resources – Ten Big data do's and don'ts.		**13**
Total Contact Hrs			**65**
Text Book	1. Judith Hurwitz, Alan Nurgent, Dr. Fern Halper, Marcia Kaufman, 2013, " Big Data for Dummies", First Edition, A Wiley Publication		
Reference Books	1. Michael Minelli, Michele Chambers, Ambiga Dhiraj, 2013, "Big Data, Big Analytics – Emerging Business Intelligence and Analytic Trends For Todays Businesses", First Edition, A Wiley Publication **2.** Strata Conference, Making Data Work, 2013, "Big Data Now", First Edition, Shroff Publication		

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M.Dhavapriya		M.Sakthi		

ELECTIVE - II

Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS2E2	**Title: ELECTIVE- II** Geographic Information and Global Positioning Systems	**Semester:** I
Hrs/Week	5	**Credit:** 5
Objectives	On successful completion of the course the students should understand the concepts of geographic information system and concepts of GPS	

UNITS	**Contents**	**Hrs**
Unit I	**Fundamentals of GIS:** Introduction – Defining GIS – Components of GIS. **Spatial Data**: Maps and their influences in the character of spatial data – Thematic characteristics of spatial data – Other sources of spatial data.	**13**
Unit II	**Spatial Data Modeling**: Entity Definition – Spatial data models – Spatial data structures – Modeling Surfaces – Modeling networks – Building computer worlds – Modeling third and fourth dimension. **Database Management:** Why choose a database approach – Database data models – Creating a database – GIS database applications – Developments in databases.	**13**
Unit III	**Data Input and Editing:** Methods of Data input – Data Editing – Towards an Integrated Databases. **Data Analysis:** Measurements in GIS – Queries – Reclassification – Buffering and Neighborhood functions – Integrating data- map overlay – Spatial Interpolation – Analysis of surfaces – Network analysis.	**13**
Unit IV	**Issues in GIS:** Data quality issues - Describing data quality and errors – Sources of errors in GIS – Finding and modeling errors in GIS – Managing GIS error - Human and organizational issues: GIS Applications – GIS Users – Justifying the investment in GIS – Choosing and Implementing a GIS – Organizational changes due to GIS - Future of GIS.	**13**
Unit V	**Global Positioning Systems:** Introduction to GPS - Accuracy of GPS - Various Satellites used by GPS - Differential GPS - Fundamentals of GPS - Applications of GPS - GPS Receivers – Hand held GPS Receiver - Integration of GIS and GPS.	**13**
Total Contact Hrs		**65**

Text Books	1. Heywood, Cornelius, Carver, 2002, "An Introduction to Geographical Information Systems", 3rd Edition, Pearson Education 2. Rao.G. S, 2010, "Global Navigation Satellite Systems", McGraw Hill Publications
Reference Books	1. Lo. C. P and Albert Yeung, 2000, "Concepts and techniques of Geographic Information Systems", PHI, New Delhi 2. Michael N. Demers, 2001, "Fundamentals of Geographic information Systems", 2nd Edition, John Wiley & Sons (ASIA) Pvt Ltd., 3. Razvi , 2002, "ArcGIS Developer's Guide for Visual Basic Applications", Onword Press

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Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS2N1	**Title:** Non-Major Elective I: Networking Technologies	**Semester:** II
Hrs/Week	1	**Credit:** 2
Objectives	On Successful completion of the course the students should have gained in - depth knowledge of Networking concepts, Internet protocols and their functionalities.	

UNITS	**Contents**	**Hrs**
Unit I	**Introduction to Computer Network:** Fundamental concepts of Network-Data communications-Protocols-Standards- Signal Propagation: Analog and Digital signals-Types of Networks: LANs (Local Area Networks)-WANs (Wide Area Networks)- MANs (Metropolitan area Networks).	**3**
Unit II	Internet-Intranet-Search engines- Modes of Data Transmission Parallel and Serial-Synchronous and Asynchronous - Simplex, Half-duplex, Full-duplex communications.	**2**
Unit III	**Multiplexing:** Types of Multiplexing- Network Topologies: What is a Network topology? Types of topology.	**3**
Unit IV	Bridges- Ethernet- Switches-Routers-Gateway-Modem.	**2**
Unit V	IP Addresses-FTP-Email-WWW. Recent trends: Bluetooth- WiFi- Wi max-RF.	**3**
Total Contact Hrs		**13**

Text Book	1. Achyut S. Godbole, 2002, "Data Communication and Networks", Tata McGraw-Hill publications
Reference Books	1. Andrew S. Tanenbaum, 2003, "Computer Networks", 4th Edition, Prentice hall of India 2. Stallings. W, 2004, "Data and Computer Communications", 7th Edition, Prentice hall of India

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Department	**Computer Science (SF)**		
Course	**M.Sc.**	**Effective from the Year: 2016-2018**	
Subject Code: 16PCS2N2	**Title:** Non-Major Elective I: Client-Server Technologies	**Semester:** II	
Hrs / Week	1	**Credit :** 2	
Objectives	To inculcate Knowledge on Client / Server Concepts and various components of client / server Applications.		
UNITS	**Contents**		**Hrs**
Unit I	Client / Server Computing – Advantages of Client / Server Computing – Technology Revolution – Connectivity – Ways to improve Performance – How to reduce network Traffic.		**3**
Unit II	Components of Client / Server Applications – The Client: Role of a Client – Client Services – Request for Service. Components of Client / Server Applications – The Server: The Role of a Server – Server Functionality in Detail.		**2**
Unit III	Components of Client / Server Applications – Connectivity: Open System Interconnect – communications Interface Technology – Inter-process communication.		**3**
Unit IV	Components of Client / Server Applications – Software. Components of Client / Server Applications – Hardware.		**2**
Unit V	Components of Client / Server applications – Service and Support: System Administration. The Future of Client / Server Computing: Enabling Technologies.		**3**
	Total Contact Hrs		**13**
Text Book	1. Patrick Smith, Steve Guenferich, 2011, "Client / Server Computing", 2nd Edition, PHI		
References	1. Robert Orfali, Dan Harkey, Jeri Edwards, 1997, "The essential client/server survival guide", 2nd Edition, Galgotia publication private limited 2. Dewire, Dawana Travis, "Client/ Server Computing", TMH		

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Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS209	**Title:** Core Lab-III : Open Source and Computing Tools Lab	**Semester:** II
Hrs/Week	5	**Credit:** 4
Objectives	On successful completion of the course the students should understand the concepts of Open Source Technologies.	

VB.NET

1. Create a program to implement looping in vb.net
2. Create a program to implement conditional statements
3. Create a calculator using basic controls

ASP.NET

4. Create a notepad editor using Context menu strip and menu controls
5. Create an application to illustrate the use validation controls.
6. Create an application for library management system
7. Create an application for Pay roll processing system
8. Create a program to generate electricity Bill
9. Server side PHP program to display marks, total, grade of a student in tabular format by accepting user inputs for name, number and marks from a HTML form.

PHP

10. PHP program to add products that are selected from a web page to a shopping cart.
11. PHP program to access the data stored in a mysql table.
12. PHP program interface to create a database and to insert a table into it.
13. PHP program using classes to create a table.
14. PHP program to upload a file to the server.
15. PHP program to create a directory, and to read contents from the directory.
16. Shell program to find the details of an user session.
17. Shell program to change the extension of a given file.

MYSQL

18. Create a MySQL table and execute queries to read, add, remove and modify a record from that table.

Total Contact Hrs	**65**

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Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS210	**Title:** Core Lab-IV: Networks	**Semester:** II
Hrs/Week	5	**Credit:** 4
Objectives	On successful completion of the course the students should understand the concepts of Client/Server , TCP,UDP.	

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

Total Contact Hrs	**65**

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SEMESTER III

Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS311	**Title:** J2EE Technologies	**Semester:** III
Hrs/Week	4	**Credit:** 4
Objectives	On successful completion of the course the students should understand the features of Java and the Web services.	

UNITS	**Contents**	**Hrs**
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):** Beans - Conditions - Directives - Declarations – Implicit 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 Contact Hrs		**52**

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

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Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS312	**Title:** Digital Image Processing	**Semester:** III
Hrs/Week	5	**Credit:** 5
Objectives	On successful completion of the course the students should understand the fundamentals of Digital Image Processing, image compression and segmentation.	

UNITS	**Contents**	**Hrs**
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-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 Contact Hrs		**65**
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	

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Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS313	**Title:** Computing Technologies	**Semester:** III
Hrs/Week	4	**Credit:** 4
Objectives	On successful completion of the course the students should understand the concepts of cloud computing, understand the developing cloud services, and understand the Centralizing Email communications and cloud computing services.	

UNITS	**Contents**	**Hrs**
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.	**10**
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.	**11**
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.	**10**
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.	**11**
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.	**10**
Total Contact Hrs		**52**

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

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ELECTIVE - III

Department	**Computer Science**		
Course	**M.Sc.**	**Effective from the Year: 2016-2018**	
Subject Code: 16PCS3E3	**Title: ELECTIVE – III** Enterprise Resource Planning	**Semester:** III	
Hrs/Week	5	**Credit:** 5	
Objectives	On successful completion of the course the students should understand the concepts of enterprise and its applications.		
UNITS	**Contents**		**Hrs**
Unit I	**ERP And Technology:** Introduction – Related Technologies – Business Intelligence–E-Commerce and E-Business – Business Process Reengineering – Product life Cycle Management – CRM.		**13**
Unit II	**ERP Implementation:** Implementation Challenges – Strategies – Life Cycle – Methodologies – Project Teams: people involved in implementation team – Process Definitions–Data Migration–Project management: ERP project management–Post Implementation Activities: POST-GO- LIVE Activities		**13**
Unit III	**ERP in Action & Business Modules:** Operation and Maintenance – Performance – Maximizing the ERP System – Business Modules – Finance – Human Resources – Plant maintenance – Quality management – Marketing – Sales, Distribution and service.		**13**
Unit IV	**ERP Market:** Marketplace – Dynamics – SAP AG – Oracle – PeopleSoft – SSA Global – Lawson Software – Intutive		**13**
Unit V	Enterprise Application Integration – ERP II – Total quality management – Future Directions – Trends in ERP.		**13**
Total Contact Hrs			**65**
Text Books	1. Alexis Leon, 2008, "ERP DEMYSTIFIED", 2nd Edition, Tata McGraw Hill 2. Mary Sumner, 2007, "Enterprise Resource Planning", Pearson Education		
Reference Books	1. Jim Manzullo, 2007, "SAP R/3 for Everyone", Pearson 2. Jose Antonio Hernandez, Jim Koegh and Franklin Foster Martinez, 2005, "The SAP R /3 Handbook", 3rd Edition, Tata McGraw Hill 3. Biao Fu, "SAP BW: A Step-by-Step Guide", 1st Edition, Pearson Education		

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Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS314	**Title:** Core Lab-V: J2EE Technologies	**Semester:** III
Hrs/Week	5	**Credit:** 4
Objectives	On successful completion of the course the students should understand the concepts of Web services, EJB and RMI.	

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

Total Contact Hrs	**65**

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Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS315	**Title:** Core Lab-VI : Digital Image Processing Lab	**Semester:** III
Hrs/Week	5	**Credit:** 4
Objectives	On successful completion of the course the students should understand about Image Processing, image compression and segmentation using MATLAB.	

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. Conversion from Color to Grayscale
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.

Total Contact Hrs	**65**

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Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS316	**Title:** Pilot Project-I	**Semester:** III
Hrs/Week	2	**Credit:** 2
Objectives	On successful completion of the course the students should understand in analyzing, designing, implementation and evaluation of software.	

Prerequisite Knowledge: SDLC, Models for Software Engineering, OOPs, Basic DBMS concepts, Design Techniques like DFD or UML etc., Basic Information of Business Processes according to project title.

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.

Rules for the Project:

1. The duration of the project will be 50 days. The students can develop their project individually or in a group of not more than 2 students. Group size can be increased with prior approval of head of institution.
2. The passing standard is 40% jointly in Internal and External examination.
3. The project can be developed in any language or platform but it is required to get approved by the head of the institution. For the purpose of approval, Students have to submit their project titles and proposals with the name of Internal and External Guides to the Head of Institution. In case, if the student proposal is rejected, the revised proposal in the same or other area is required to submit and get it sanctioned. Failing to do this, his/her term will not be granted.
4. The students have to report to the internal guide for at least 4 times during the project life span with the progress report duly signed by external guide. Moreover they have to bring these reports with the final report at the time of external examination.

Total Contact Hrs	**26**

SEMESTER IV

Department	**Computer Science**	
Course	**M.Sc.**	**Effective from the Year: 2016-2018**
Subject Code: 16PCS417	**Title:** Industrial Project Work And Viva Voce (Individual)	**Semester:** IV
Hrs/Week	-	**Credit:** 8
Objectives	Provide experience to the students in analyzing, designing, implementation and evaluation of software.	

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 : 80+80=160

VIVA-VOCE : 20+20=40