

**CMS COLLEGE OF SCIENCE & COMMERCE
(AUTONOMOUS)**

(Affiliated to Bharathiar University)

**An ISO 9001: 2008 Certified Institution and Re-accredited at the
'A' level with a CGPA of 3.53 out of 4 by NAAC
Chinnavedampatti, Coimbatore - 641 049**

Email: info@cmscbe.com

Website: www.cmscbe.com



Since 1988

M.Sc. (Computer Science)

DEPARTMENT OF COMPUTER SCIENCE

SYLLABUS

SCHEME OF EXAMINATION (CBCS)

2016 Onwards

DEPARTMENT OF COMPUTER SCIENCE REGULATIONS

INTRODUCTION

Applications of computer is one of the thrust areas in science and technology. In appreciation of its growing importance in business and visualizing the career prospects, The curriculum of this course is framed with theoretical concepts in computer applications and the students are capable of meeting the ever-changing challenges, having earnestly qualified themselves to be well ahead of time in the IT world.

The training imparted aims to prepare young minds for the challenging opportunities in the IT industry with a global awareness rooted in the Indian soil, nourished and supported by experts in the field.

OBJECTIVES

Visualizing on futuristic scenario the two years Master of Computer Science spotlights the era of mass diffusion of computers in IT world.

Four semesters, with one paper in the final semester being an exposure to the real-time project, the course magnifies the minds of the students to explore & push forward, enrich & enable their potential through ample logical reasoning, analytical ability and group discussions to make their way towards developing technical and managerial skills. In order to develop the caliber of each individual, students are trained in logical and lateral thinking to establish them as well-grounded individuals.

1. **Eligibility:** Candidates seeking admission to the first year course will be required to possess: A pass in B.Sc. (Computer Science/Electronics/Software Systems)/B.C.A./B.Sc. (Applied Science - Information Technology/ Computer Technology)/ B. Sc (CT / IT).
2. **Duration of the Course:** The course is offered on a full-time basis. The course consists of three semesters of course work and laboratory work and the fourth semester consists of a project work.
3. **Regulations:** The general Regulations of the Bharathiar University's Choice Based Credit System programme are applicable to this programme.
4. **The Medium of Instruction and Examinations:** The medium of instruction and Examinations will be in English.
5. **Practical Examinations & Project Work:** Candidates taking Practical Examinations and Project work should submit bonafide record note book and project report in the prescribed format. Defaulters will not be entertained for practical examination or project viva-voce.

DISTRIBUTION OF THE MARKS AND CREDITS UNDER CBCS

PART	SUBJECT	No of Papers	Marks @	Credits
III	Core Subjects	17\$	1700	68
	Elective Subjects	3	300	12
	Mini Project	1	50	2
	Project	1	200	8
IV	Extra Departmental Course (Self study)	1	100	4
	Total	23	2350	94

Note:

@ Includes 25/40 % continuous assessment marks for theory and practical subjects respectively.

\$ In core subjects both theory and practical should be included wherever applicable.

The following parameters are considered throughout the study period.

- i)** Regularity of Attendance
- ii)** Active participation in classes/Camps/Games (College/District//University)
- iii)** Exemplary awards/certificates/prizes
- iv)** Other Social Components (Blood Camp, Fine Arts etc)

CMS COLLEGE OF SCIENCE& COMMERCE, COIMBATORE - 641 049**(Autonomous)****M.Sc. COMPUTER SCIENCE****SCHEME OF EXAMINATION - CBCS PATTERN**

(For the students admitted from the academic year 2016 Onwards)

Part	Sub code	Subject	Ins.hrs/ week	Examinations				Credit
				Dur. In hrs	CIA	ESE	Total marks	
Semester - I								
III	13A	Design and Analysis of Algorithms	5	3	25	75	100	4
III	13B	Distributed Operating System	5	3	25	75	100	4
III	13C	TCP/IP Networks	5	3	25	75	100	4
III	13D	J2EE Programming	5	3	25	75	100	4
III	13E	Elective I:	5	3	25	75	100	4
III	13P	J2EE Programming Lab	5	3	40	60	100	4
Semester - II								
III	23A	Expert Systems	4	3	25	75	100	4
III	23B	Advanced Data Structure	4	3	25	75	100	4
III	23C	C# Technologies	4	3	25	75	100	4
III	23D	Parallel Processing	4	3	25	75	100	4
III	23E	Elective II :	4	3	25	75	100	4
III	23P	C# Technologies Lab	5	3	40	60	100	4
III	23Q	Advanced Data Structure Lab	5	3	40	60	100	4

CMS COLLEGE OF SCIENCE& COMMERCE, COIMBATORE - 641 049**(Autonomous)****M.Sc. COMPUTER SCIENCE****SCHEME OF EXAMINATION - CBCS PATTERN**

(For the students admitted from the academic year 2016 onwards)

Part	Sub code	Subject	Ins.hrs/ week	Examinations			Total marks	Credit
				Dur. In hrs	CIA	ESE		
Semester - III								
III	33A	Pattern Recognition	4	3	25	75	100	4
III	33B	Cyber Security	4	3	25	75	100	4
III	33C	Big Data Analytics	4	3	25	75	100	4
III	33D	Open Source Software	4	3	25	75	100	4
III	33E	Elective III :	4	3	25	75	100	4
III	33P	Pattern Recognition Lab	5	3	40	60	100	4
III	33Q	Open Source Software Lab	5	3	40	60	100	4
	33V	Mini Project and Viva Voce <i>(Internal - 30 marks; External - 20 marks)</i>	-	-	-	50	50	2
Semester - IV								
III	43V	Project and Viva - Voce <i>(internal - 150 marks; external - 50 marks)</i>	-	-	-	200	200	8
		Total					2250	90

LIST OF GROUP ELECTIVE PAPERS

List of Elective Papers		
Elective - I	A	Data Compression
	B	Distributed Data Base Management Systems
	C	Enterprises Resource Planning
Elective - II	A	Soft computing
	B	Design Pattern in Java
	C	Android Programming
Elective - III	A	Software Project Management
	B	Digital Image Processing
	C	Object Oriented Analysis and Design

CMS COLLEGE OF SCIENCE & COMMERCE, COIMBATORE - 641 049.**(Autonomous)****Department of Computer Science****SCHEME OF EXAMINATION - CBCS PATTERN****EXTRA DISCIPLINARY COURSE (EDC)****(For the students admitted during the academic year 2015 Onwards)**

Part	Sub code	Subject	Ins.hrs/ week	Examinations				
				Dur. Exam in hrs	CIA	ESE	Total marks	Credit
Semester III								
IV		E-Commerce	-	3	25	75	100	4
Total			-	-	-	-	100	4

Note :

- The student has to compulsorily select one Extra Disciplinary Course offered by other departments and are eligible to get 4 extra credits. This paper is offered as a self study from the 2015 batch onwards.

Course	M.Sc. Computer Science						
Subject Code	13A	Subject Title	Design and Analysis of Algorithms			Semester	I
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	5
For the Batch	2016 Onwards		Credits				4
Objective & Subject Description	This course presents an introduction to the algorithms; their analysis design and various methods like divide and conquer method, Dynamic programming, Backtracking and parallel models.						

UNIT - I

Introduction: Algorithm specification - performance analysis: Space Complexity - Time complexity - Asymptotic Notation - Practical Complexities - Performance Measurement. Elementary Data Structures: Graphs.

UNIT - II

Divide and conquer: General method - Binary search - Merge sort - Quick sort. Basic Traversal and Search techniques: Techniques for Binary Trees - Techniques for Graphs - Connected Components and Spanning Trees.

UNIT - III

The Greedy method: General method - Knapsack problem - Minimum cost spanning trees - Single source shortest path. Dynamic Programming: General method - All pairs shortest path - optimal binary search trees - 0/1 knapsacks - The traveling salesperson problem.

UNIT - IV

Backtracking: General method - The 8 Queens Problem - Sum of subsets - graph coloring - Hamiltonian cycles - knapsack problem. Branch and bound: The method - Least Cost (LC) Search - FIFO Branch and Bound - LC Branch and Bound - 0/1 Knapsack problem - traveling salesperson.

UNIT - V

Introduction to Parallel Processing: Parallel computer Structures: Array of Computers. Structures and Algorithms for Array Processors: SIMD Array Processors: SIMD Computer Organization - Masking and Data Routing Mechanisms - Inter-PE Communications. Parallel Algorithms for Array Processors: SIMD Matrix Multiplication - Parallel Sorting on Array Processors.

Text Books:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran -Computer Algorithms- Galgotia Publication Pvt. Ltd, 2008.
2. Kai Hwang and Faye A. Briggs - Computer Architecture and Parallel Processing, - McGraw-Hill International Editions, First Edition, 2000.

Reference Books :

1. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman - Data Structures and Algorithms, Pearson Education Asia, 2008.
2. Michael T. Goodrich -Data Structures & Algorithms in Java- Wiley Computer Publishing, Third Edition, 2005.

Course	M.Sc. Computer Science						
Subject Code	13B	Subject Title	Distributed Operating System			Semester	I
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	5
For the Batch	2016 Onwards		Credits				4
Objective & Subject Description		This subject provides an introduction to advanced distributed operating system algorithms and theory with case studies. On successful completion of this subject the students will learn distributed operating system design and their implementation and will be able to perform independent research in distributed system.					

UNIT - I

Fundamentals: What is a Distributed Computing System? - Evolution of Distributed Computing Systems - Distributed Computing System models - Why are Distributed Computing System gaining popularity? - What is a Distributed Operating System? - Issues in designing a Distributed Operating System - Introduction to Distributed Computing Environment. Computer Networks: Introduction - Network types - LAN,WAN technologies.

UNIT - II

Message Passing: Introduction - Features -Issues in IPC by message passing - Synchronization - Buffering -Multi-datagram messages - Encoding and Decoding of message data - Process addressing -Failure handling. 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.

UNIT - III

Distributed Shared Memory: Introduction - General architecture of DSM systems - Design and implementation issues of DSM - Granularity - Structure of shared memory space - Consistency models. Replacement strategy - Thrashing. Synchronization: Introduction - Clock synchronization - Event ordering - Mutual exclusion.

UNIT - IV

Resource Management: Introduction - Desirable features of a good global scheduling algorithm - Task assignment approach - Load balancing approach - Load sharing approach. Process Management: Introduction - Process migration - Threads

UNIT - V

Distributed File System: Introduction - Desirable features of a good distributed file system - File models - File accessing models - File sharing semantics - File caching schemes - File replication - Fault tolerance. Case studies: Amoeba - V system.

Text Book:

1. Pradeep K. Sinha, "Distributed Operating Systems", Prentice hall publication, 2005.

Reference Book:

1. Andrew S. Tanenbaum, "Distributed Operating Systems", Pearson Education Publication, 1995.

Course	M.Sc. Computer Science						
Subject Code	13C	Subject Title	TCP/IP Networks			Semester	I
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	5
For the Batch	2016 Onwards		Credits				4
Objective & Subject Description	This subject provides an introduction to internetworking with TCP/IP. On successful completion of this subject the students will learn internetworking concept and Internet protocol.						

UNIT - I

Introduction and overview: The motivation for internetworking - The TCP/IP internet - Internet services - History and scope of internet - The internet architecture board - The IAB reorganization - Internet requests for comments - Future growth and technology. Review of underlying technologies: Introduction - Two approaches -Wide area and local area networks - Ethernet technology - Switched Ethernet - Asynchronous transfer mode. Internetworking concept and architectural model: Application level interconnection - Network level interconnection - Properties of the internet - Internet architecture - Interconnection through IP routers.

UNIT - II

Classful Internet Addresses: Universal identifiers - The original classful addressing scheme - Addresses specify network connections - Network and directed broadcast addresses - Limited broadcast - All Os address - Subnet and classless extensions - IP multicast addresses - Weaknesses in internet addressing - Dotted decimal notation - Loopback address. Mapping internet addresses to physical addresses: 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 - ARP implementation - ARP encapsulation and identification - ARP protocol format - Automatic ARP cache revalidation - Reverse Address Resolution.

UNIT - III

Internet Protocol: Forwarding IP Datagrams - Forwarding - Direct and indirect delivery - Default routes - Host specific routes - The IP forwarding algorithm - Forwarding with IP addresses - Handling incoming datagrams - Establishing routing tables. Internet Protocol: Error and control messages - The internet control message protocol - Error reporting vs. error correction - ICMP message delivery - ICMP message format -Source quench format - Route change requests from routers - Detecting circular or excessively long routes. Classless and subnet address extensions: Minimizing network numbers - Proxy ARP - Subnet addressing - Flexibility in subnet address assignment - Variable length subnets - Subnet implementation -0 Forwarding - subnet forwarding algorithm - Unified forwarding algorithm - Maintenance of subnet masks - Broadcasting to subnets - Anonymous point - to - Point networks - Classless addressing and super netting.

UNIT - IV

User Datagram Protocol: Format of UDP messages - UDP pseudo header - UDP encapsulation and protocol layering - Layering and UDP checksum computation. Reliable stream transport service: The need for stream delivery - properties of reliable delivery service - Providing reliability - The idea behind sliding windows - The transmission control protocol - Ports, connections, endpoints - Passive and active opens - Segments, streams and sequence numbers - Variable window size and flow control - TCP segment format - Out of band data - TCP options - TCP checksum computation - Acknowledgements, retransmission and timeouts - Accurate measurement of round trip samples - Karn's algorithm and timer back off - Responding to high variance in delay - Response to congestion - Fast recovery - Feedback mechanisms - Congestion, Tail drop - Random Early Detection. Routing architecture: The origin of routing tables - Forwarding with partial information - Internet architecture and cores - Beyond core architecture - Automatic route propagation - Distance vector routing - Reliability and routing protocols - Link state routing.

UNIT - V

Routing between Peers: Routing update protocol scope - Determining a practical limit - Extra hops - Autonomous system concept - Exterior gateway protocols and reachability - BGP characteristics - BGP functionality and message types - BGP message header - BGP open message - update message - Compressed mask address pairs - BGP path attributes - BGP KEEPALIVE message. Routing within an autonomous system: Static vs. Dynamic interior routes - Routing information protocol - Slow convergence problem - Solving the slow convergence problem - RIP1 message format - RIP2 address conventions - RIP route interpretation and aggregation - RIP2 extensions and message format - The disadvantage of RIP hop counts - Delay metric (HELLO) - Delay metrics and Oscillation - Combining RIP, Hello and BGP - Inter autonomous system communication - the open SPF protocol - Routing with partial information.

Text Book:

1. Douglas E Comer, "Internetworking with TCP/IP", Prentice Hall of India, 2008.

Reference Book:

1. William Stallings, "Internetworking with TCP/IP", TMH Publications, 3rd Edition.

Course	M.Sc. Computer Science						
Subject Code	13D	Subject Title	J2EE Programming			Semester	I
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	5
For the Batch	2016 Onwards		Credits				4
Objective & Subject Description	Understand the concept of Servlet and JSP as dynamic content generation technologies at web-tier and other relevant J2EE APIs and technologies						

UNIT I

J2EE and J2SE - **J2EE Multi-Tier Architecture:** Distributive Systems - The Tier - J2EE Multi Tier Architecture - Client Tier Implementation - Web Tier Implementation - **J2EE Best Practices :** Enterprise Application Strategy - The Enterprise Application - Clients - Sessions Management - Web Tier and Java Server Pages - Enterprise JavaBeans Tier - The Myth of Using Inheritance - Maintainable classes.

UNIT II

J2EE Database Concepts - Database Schemes - The Art of Indexing - **JDBC Objects :** The Concept of JDBC - JDBC Driver Types - JDBC Packages - Database Connection - Associating the JDBC/ODBC Bridge with the Database - Statement Objects - Result Set - Transaction Processing - Metadata.

UNIT III

Java Servlets : Java servlets and Common Gateway Interface Programming - A simple java servlet - Anatomy of a java servlet -**Java Server Pages:** JSP - JSP Tags - Tomcat - Request String - User Sessions - Cookies - Session Objects - **Enterprise Java Beans:** EJB - Session Java Bean - Entity Java Bean - Message Driven Bean.

UNIT IV

Java Remote Method Invocation: Remote Method Invocation Concept - Server side - Client side - Java Message Service: Message Service - Java Messaging Service -JMS Fundamentals - Components of a JMS Program -**Security:** J2EE Security Concepts - JVM Security - Security Management - Java API Security - Browser Security - Web services security.

UNIT V

SOAP : SOAP Basics - Java API for XML Messaging - Create, Send and Receive a Point-to Point SOAP Message - Create and send a SOAP Message Using a Messaging Provider - Creating a SOAP attachment - **Web Services Description Language (WSDL):** Inside WSDL - WSDL and SOAP - WSDL and HTTP binding - WSDL and MIME binding.

Text Book:

1. Jim Keogh, The Complete Reference J2EE, Tata McGraw Hill Edition, 2009.

Reference Books:

1. Java server programming (J2EE 1.4) Black Book, ,2007, Kogent Solutions Inc.
2. James McGoven, Rahim Adatis & Group- J2EE 1.4 Bible, Dreamtech Publishing, 2006.

Course	M.Sc. Computer Science						
Subject Code	13P	Subject Title	J2EE Programming Lab			Semester	I
Internal Max:	40	External Max :	60	Total Marks	100	Hr./Week	5
For the Batch	2016 onwards		Credits				4

List of Practicals

1. Develop a login verification application using Servlets.
2. Prepare an E-resume using Servlets.
3. Develop a registration form in html and sends the data to a servlet that displays it.
4. Prepare a Purchase Order form using Html and Servlet.
5. Develop a web page for calculating mark percentage of a student using JSP.
6. Prepare a ticket reservation form using JSP.
7. Prepare an Employee pay slip using JSP.
8. Develop an application for displaying records from a SQL table.
9. Develop an application for inserting records into a SQL table.
10. Develop an application for processing a customer entity bean.

MINI PROJECTS:

11. Develop a web application for College administration system (Student personal details and fees processing).
12. Develop a web application for College administration system (Student attendance details and mark processing)
13. Develop a web application for Hotel administration system (Customer details, room allotment and billing)
14. Develop a web application for HR management system (Employee details and recruitment processing)
15. Develop a web application for Supermarket management system (Product details, Stock processing and billing)

Course	M.Sc. Computer Science						
Subject Code	13E	Subject Title	Elective I (A) – Data Compression			Semester	I
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	5
For the Batch	2016 Onwards		Credits				4
Objective & Subject Description		The subject describes various compression techniques, Huffman coding & Arithmetic coding, Dictionary techniques, and Scalar and vector quantization. To provide students with a clear understanding of data compression techniques.					

UNIT I

Compression techniques - Modeling and coding. Mathematical preliminaries for lossless compression: Models - Coding.

UNIT II

Huffman coding: The Huffman coding algorithm - Adaptive Huffman coding - Golomb codes - Rice codes - Tinstall codes - Application of Huffman coding. Arithmetic coding: Coding a sequence - Generating a binary code - Comparison of Huffman and arithmetic coding.

UNIT III

Dictionary Techniques: Static dictionary - adaptive dictionary - Applications-File compression - UNIX compress - Image Compression- The Graphics Interchange Format (GIF). Context-based compression: Prediction with partial match - The burrows-wheeler transform - Associative coder of Buyanovsky(ACB) - Dynamic markov compression. Lossless image compression: Introduction - CALIC - JPEG-LS - Multi resolution approaches.

UNIT IV

Mathematical preliminaries for lossy coding: Distortion criteria - models. Scalar Quantization: The quantization problem - Uniform quantizer - adaptive quantization - non uniform quantization - entropy-coded quantization.

UNIT V

Vector quantization: Advantages of vector quantization over scalar quantization - The Linde-Buzo-Gray algorithm - tree structured vector quantizers - structured vector quantizers. Differential encoding: Introduction -The basic algorithm - Prediction in DPCM - Adaptive DPCM.

Text Book:

1. Khalid Sayood, 'Introduction to Data Compression' , 2006, Morgan Kaufmann Publishers.

Reference Book:

1. David Salomon, 'Data Compression- The complete reference' , Springer publications, 3rd Edition, 2004

Course	M.Sc. Computer Science						
Subject Code	13E	Subject Title	Elective I (B) – Distributed Data Base Management Systems			Semester	I
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	5
For the Batch	2016 Onwards		Credits				4
Objective & Subject Description	The subject describes levels of distribution transparency, queries handling, transactions management, reliability, R* project, etc. To provide students with a clear understanding of distributed databases.						

UNIT I

Distributed Databases, An Overview: Features of distributed versus centralized databases – Why distributed databases? – Distributed database management systems. Levels of Distribution transparency – Reference architecture for distributed databases – Types of data fragmentation – Distribution transparency for read-only applications – Distribution transparency for update applications – Distributed database access primitives. Distributed database design: A framework for distributed database design – the design of database fragmentation – the allocation of fragments.

UNIT II

Translation of global queries to fragment queries: Equivalence transformations for queries – transforming global queries into fragment queries – distributed grouping and aggregate function evaluation. Optimization of access strategies: A framework for query optimization – join queries – general queries.

UNIT III

The management of distributed transactions: A framework for transaction management – supporting atomicity of distributed transactions – concurrency control for distributed transaction - architectural aspects of distributed transactions. Concurrency control: Foundations of distributed concurrency control – Distributed deadlocks – Concurrency control based on timestamps – optimistic methods for distributed concurrency control.

UNIT IV

Reliability: Basic concepts – non blocking commitment protocols – reliability and concurrency control – determining a consistent view of the network – detection and resolution of inconsistency – checkpoints and cold restart. Distributed database administration: Catalog management in distributed databases – authorization and protection.

UNIT V

The R* project: Architecture of R* - Compilation, execution, and recompilation of queries – view management – protocols for data definition and authorization in R* - Transaction management – terminal management. Other homogeneous distributed database systems: DDM – Distributed – INGRES . Heterogeneous Distributed Database Systems: Problems of Heterogeneous distributed databases – MULTIBASE – DDTS.

Text Book:

1. Stefano Ceri, Giuseppe Pelagatti, 'Distributed Databases, Principles & Systems', McGraw-Hill Publications, 2000.

Reference Book:

1. Chanda Ray, 'Distributed Database Systems', Palgrave Publications, 2000.

Course	M.Sc. Computer Science						
Subject Code	13E	Subject Title	Elective I (C) - Enterprise Resource Planning		Semester	I	
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	5
For the Batch	2016 Onwards		Credits			4	
Objective & Subject Description	To gain knowledge in data warehousing, data mining techniques and algorithms.						

UNIT - I

Enterprise An Overview: Definition-Integrated management Information-Business Modeling-Integrated data model. Introduction to ERP: Introduction-History of ERP- Reasons for the growth of the ERP market-Advantages of ERP.

UNIT - II

ERP and Related Technologies : Introduction - Business Process Engineering - Data Warehousing- Data mining - On-line Analytical Processing - Product Life Cycle Management PLM - CRM - Geographical Information System- Internets & Extranets. Business Intelligence BI - introduction to E-commerce & E-Business.

UNIT - III

ERP Implementation Life cycle: Introduction - objectives - Different phases of ERP implementation. Implementation methodologies: Introduction - Managing the implementation - implementation strategy - risk assessment - budget - cost-ERP implementation Hidden costs.

UNIT - IV

ERP Modules: Introduction to ERP resource planning system -Functional Modules - Finance-plant maintenance - quality management - materials management- Human resources.

UNIT - V

ERP case Studies: SAP at Tata Steel (TISCO)-IQMS at Sturgis Molded Products (SMP) - SAP at Co-Operative Bulk Handling Ltd. (CBH) - INTUITIVE at Iarcimedics- MATRIX ERP Mani Group-JD EDWARDS at Hindustan Petroleum - ORACLE at Qualcomm CDMA Technologies.

Text Book:

1. Alex Leon - Enterprise Resource Planning, Tata McGraw Hill Publishing Company Ltd., 2010.

Reference Books:

1. Parag Diwan, Sunil Sharma, Enterprise Resource Planning, Excel Books, 2002.
2. Vinod Kumar Garg, N.K. Venkatakrishnan, Enterprise Resource Planning Concepts and Practice, Prentice Hall India, 2003.

Course	M.Sc. Computer Science						
Subject Code	23A	Subject Title	Expert Systems			Semester	II
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	4
For the Batch	2016 Onwards		Credits				4
Objective & Subject Description		This subject provides an introduction to Expert Systems to bring current trends and advances in the discipline to the forefront, the students should understand the role of Expert Systems and develop abilities to apply, build and modify decision models to solve real problems.					

UNIT - I

Introduction to Expert Systems: Expert systems utilization and functionality: Introduction - Consultation function - Explanation function -Acquisition/Modification function. - Architecture of Expert Systems: Introduction - Knowledge base - The cognitive system - The work space - The interface - Examples: Introduction - A toy inference engine - PROLOG as an inference engine.

UNIT - II

Knowledge representation: Introduction - Decomposition/Hierarchy of knowledge -Augmented transition Networks - Uni and Multi-dimensional networks - The semiotic analysis of knowledge - Object representations and object languages. Semantics of Expert Systems: Knowledge base and chaining functions: Introduction - The set of facts - The set of rules - Forward chaining functions - Backward chaining functions.

UNIT - III

Modeling of uncertain reasoning: Introduction - Measures of certainty and uncertainty - Product measures - Uncertain reasoning in an Expert System - Determination of the computation. Coherence - Introduction - Functions and sets of exclusion and of effacement -Fundamental sets attached to a fact - Tests of validation - Validation of a base of meta knowledge - algorithms for computation of fundamental sets. Reduction of sets of rules: Introduction - an example - sReduction of a set of rules - aReduction of a set of rules - Algorithms for reduction - Distribution of And and Or.

UNIT - IV

Practical problem solving: Heuristic Classification (I): Classifications of expert systems tasks - Classification problem solving - Classification versus Construction. Hierarchical hypothesize and test: Motivation and overview - Structured objects in CENTAUR - Model based reasoning in INTERNIST - TDE as knowledge engineering workbench. Constructive problem solving (I): Motivation and overview - A case study R1/XCON - Elicitation, evaluation and extensibility.

UNIT - V

Advanced topics in Expert Systems: Diagnosis from first principles: Basic assumptions - Reiter's theory of diagnosis - Comparison with other approaches. Formal models of plausible inference: Dempster Shafer theory - Pearl's theory of evidential reasoning in a hierarchy - Comparing methods of inexact reasoning - summarizing the state of uncertainty. Rule Induction by machine learning: Overview of inductive learning -Early work - Induction of decision rules - Induction of decision trees.

Text Books:

1. Jean-Louis Ermine, Expert Systems Theory and Practice, Prentice hall publication, Second Edition, 1995.
2. Pewter Jackson, Introduction to Expert Systems, Addison Wesley Publication, Second Edition, 1994.

Reference Book:

1. S.N.Sharan, Fundamentals of Expert Systems, CBS publication, First Edition, 1993.

Course	M.Sc. Computer Science						
Subject Code	23B	Subject Title	Advanced Data Structure			Semester	II
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	4
For the Batch	2016 Onwards		Credits				4
Objective & Subject Description	This subject provides an introduction about advanced concepts in data structures. On successful completion of this subject the students will know various data structures and their working methods.						

UNIT I

Stacks and Queues: The Stack Abstract Data Type-The Queue Abstract data Type- Evaluation of Expressions. Graphs: Minimum Cost Spanning Trees-Shortest Paths and Transitive Closure.

UNIT II

Trees: Introduction- Binary Tress- Binary Tree Traversal-Additional Binary Tree Operations- Threaded Binary Trees- Heaps-Binary Search Trees-Selection Trees.

UNIT III

Priority Queues: Single and Double Ended Priority -leftist Trees-Binomial Heaps- Fibonacci Heaps-Pairing Heaps- Interval Heap.

UNIT IV

Multi way Search Trees: m-way Search Trees-B-Trees-B+Trees

UNIT V

Digital Search Structures: Digital Search Trees-Binary Tries and Patricia-Multiway Tries- Tries and Internet Packet Forwarding. Case Study: A mazing Problem

Text Book:

1. Ellis Horowitz, Sartaj Sahini, Dinesh Mehta, Fundamentals of Data structures in C++, Universities Press, Second edition, 2008.

Reference Book:

1. Trembly, Sorenson, Data structures, TataMcGraw Hill , Second edition, 1997.

Course	M.Sc. Computer Science						
Subject Code	23C	Subject Title	C# Technologies			Semester	II
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	4
For the Batch	2016 Onwards		Credits				4
Objective & Subject Description	This subject deals with the basic concepts of C#						

UNIT I

Classes And Objects: Classes - System. Object class-Structures-Interfaces: Defining and implementing an interface- Extending interfaces-Interface casting- The is and as operators- Overriding Interface implementations.

UNIT II

Inheritance: Understanding inheritance - Implementation inheritance: Abstract class and methods- Virtual methods-Overloading methods and operators-Access modifiers-calling base class constructors-Delegates and Events.

UNIT III

Threading: Need for Multithreading- Thread synchronization-Thread safety in Windows Forms-Files and Streams: Working with Files and Directories- The Stream Class-Compressions for Stream Objects.

UNIT IV

Exception Handling: Handling exceptions-creating custom exceptions-Language Integrated Query (LINQ): Architecture - LINQ to Objects-LINQ to Dataset- LINQ to XML- LINQ to SQL

UNIT V

Application development using C#:Developing Windows Applications: The Project- Adding print capability-Deploying the application - Developing ASP.NET Web Applications :Data Binding - Building responsive applications using AJAX.

Text Book:

1. C# 2008 - Programmer's Reference, Wei-Meng Lee, Wiley India Pvt Ltd.

Reference Books:

1. Programming C# 3.0, Jesse Liberty and Donald Xie, O'REILLY, Fifth Edition, 2009.
2. C# 2.0 -The Complete Reference, Herbert Schildt, Tata McGraw Hill Publishing, Second Edition, 2006.

Course	M.Sc. Computer Science						
Subject Code	23D	Subject Title	Parallel Processing			Semester	II
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	4
For the Batch	2016 onwards		Credits				4
Objective & Subject Description	The subject describes students parallel processing architecture, pipelining and vector processing, vectorization methods, array processors, SIMD computer and multiprocessor architecture. To provide students with a clear understanding of parallel processing.						

UNIT I

Introduction to parallel processing: Evolution of computer systems - Parallelism in uniprocessor systems - Parallel computer structures - Architectural classification schemes - Parallel processing applications.

UNIT II

Principles of pipelining and vector processing: Pipelining, An overlapped parallelism - Instruction and arithmetic pipelines - Principles of designing pipelined processors

UNIT III

Pipeline computers and vectorization methods: The space of pipelined computers - Recent vector processors - Vectorization and optimization methods.

UNIT IV

Structures and algorithms for array processors: SIMD array processors - SIMD interconnection networks (Static versus dynamic networks, mesh-connected iliac network, Cube interconnection networks) - Parallel algorithms for array processors (SIMD matrix multiplication, parallel sorting on array processors) - Associative array processing.

UNIT V

SIMD Computers and performance enhancement: The space of SIMD computers - The massively parallel processor.

Multiprocessor architecture and programming: Functional structures - Interconnection networks - Multiprocessor operating systems.

Text Book:

1. Kai Hwang, Faye A. Briggs, 'Computer Architecture and Parallel Processing', 1984, McGRAW HILL Publications.

Reference Book:

1. Carling A, 'Parallel processing' , 1992, Galgotia Publications.

Course	M.Sc. Computer Science						
Subject Code	23P	Subject Title	C# Technologies Lab			Semester	II
Internal Max:	40	External Max :	60	Total Marks	100	Hr./Week	5
For the Batch	2016 Onwards		Credits				4

List of Practicals

1. Write a Program that adds elements to List in C# through loops.
2. Write a C# Program that uses for each on List.
3. Write a C# Program that uses Reverse function.
4. Write a C# program by using Virtual method
5. Write a C# program to display the memory locations using Struct.
6. Write a C# program for extending and combining Interfaces.
7. Write a C# program using a simple indexer.
8. Write a C# program using jagged array.
9. Write a C# program to display a simple LINQ Query.
10. Write a C# program to work with ADO.NET.
11. Write a C# program by using ASP.NET with Data Binding.
12. Write a C# program using Windows Forms Applications.
13. Working mode of an application using case sensitive.
14. Create a simple website using C#.
15. Write a program to find the number of hits in a web site.

Course	M.Sc. Computer Science						
Subject Code	23Q	Subject Title	Advanced Data Structure Lab			Semester	II
Internal Max:	40	External Max :	60	Total Marks	100	Hr./Week	5
For the Batch	2016 Onwards		Credits				4

List of Practicals

1. Write a menu driven program to implement queue using pointers.
2. Write a menu driven program to implement stack using pointers.
3. Develop an application that transforms from one form to another form and find out how much space and time does the function take.
 - a) Infix to postfix
4. Develop an application that transforms from one form to another form and find out how much space and time does the function take.
 - b) Infix to prefix
5. Develop an application that finds the shortest path given the various routes in a network.
6. Implement Binary tree traversals using a program.
7. Develop an application for implementing Binary search Tree.
8. Implement a program for single ended priority Queue.
9. Implement a program for Binomial Heap.
10. Implement a program for Fibonacci Heap.
11. Program to implement the concept of Leftist Heap
12. Develop a program implement m-way search tree.
13. Develop a program implement B+ tree.
14. Develop a program to illustrated Binary Tries.
15. Write a program to implement mazing problem.

Course	M.Sc. Computer Science						
Subject Code	23E	Subject Title	Elective II (A) - Soft Computing			Semester	II
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	4
For the Batch	2016 onwards		Credits				4
Objective & Subject Description		This subject provides an introduction to the basic concepts of Soft Computing methodology and covers three main components - Neural Networks, Fuzzy Logic and Genetic Algorithms. On successful completion of this subject the students should have the Knowledge on solutions to problems which are cross-disciplinary.					

UNIT - I

Introduction to Artificial Intelligence and Soft Computing: Artificial Intelligence - The Turing Test - Soft Computing - Artificial Neural Network - Fuzzy Logic - Genetic Algorithms - Hybrid Intelligent Systems. Overview of Neural Networks: Basic concepts - Biological Neuron - Modeling an Artificial Neuron - Major Components of an Artificial Neuron.

UNIT - II

Overview of Neural Networks: Neural Network Architectures - Learning Technologies - The Perceptron - Advantages and Disadvantages of Neural Networks - Application areas of Neural Networks - History of early Neural Network Activities.

UNIT - III

Learning in Feedforward Networks: The Perceptron - Multi Layer Perceptron - Learning in Multi Layer Perceptrons - the Back propagation Networks - Back Propagation Training Algorithm - Applications of the Back propagation Model. Introduction to Fuzzy Logic & Fuzzy set theory: Fuzzy world - What is Fuzzy Logic? - Evolution of Fuzzy Logic - Deriving force behind Fuzzy Logic - Fuzzy Logic for control - Crisp sets - Fuzzy sets - Types of membership functions - Operation on Fuzzy sets - Properties of Fuzzy sets - Basic concepts and Geometric representations of Fuzzy sets.

UNIT - IV

Fuzzy and Crisp Relations: Crisp relations - Fuzzy relations - Fuzzification - Defuzzification. Fuzzy rules and Fuzzy Rule-Based Systems: Classical logic - Predicate logic - Fuzzy proposition logic - Fuzzy if-then rules - Fuzzy inference systems- Types of Fuzzy inference systems - Fuzzy controllers - application areas of Fuzzy logic.

UNIT - V

Genetic Algorithms: History of Evolutionary computation - Classical search and Optimization methods - Fundamentals of Genetic algorithms - The Algorithm - Encoding - The GA operators - An example - Advantages, limitations and applications of Genetic Algorithm - Related techniques.

Text Book:

1. Manish Mahajan and RajdevTiwari, Introduction to Soft Computing, Acme Learning Private Limited, First Edition, 2010.

Reference Book:

1. S.Rajasekaran and G.A.VijayalakshmiPai, Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI Learning Private Limited, Fourteenth Printing, 2003.

Course	M.Sc. Computer Science						
Subject Code	23E	Subject Title	Elective II (B) – Design Pattern in Java			Semester	II
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	4
For the Batch	2016 Onwards		Credits				4
Objective & Subject Description		This Subject teaches Basic architecture of entire OOPS concept with its patterns. At the end of this course, student will have through knowledge in Practical Implementation of OOPS concepts for any real life problems.					

UNIT I

What is a Design Pattern? – Design Patterns in Smalltalk MVC – Describing Design Patterns – Organizing the Catalog – How Design Patterns Solve Design Problems? – How to Select a Design Patterns? – how to use a Design Pattern. Designing a Document Editor: Design Problem – Document Structure – Formatting – Embellishing the User Interface – Supporting Multiple Look-and-Feel Standards – Supporting Multiple Window Systems – User Operations – Spelling Checking and Hyphenation.

UNIT II

Creational patterns: Abstract Factory – Builder – Factory Method – Prototype – Singleton – Discussion of Creational Patterns. Structural Patterns: Adapter – Bridge – Composite – Decorator – Façade – Flyweight – Proxy – Discussion of Structural Patterns.

UNIT III

Behavioral Patterns: Chain of Responsibility – Command – Interpreter – Iterator – Mediator – Memento – Observer – State – Strategy – Template Method.

UNIT IV

Operation Patterns: Introducing Operations – Operations and Methods – Signatures – Exceptions – Algorithms and Polymorphism. TEMPLATE METHOD: Sorting – Completing an Algorithm – Template Method Hooks. STRATEGY: Modeling Strategies – Refactoring to Strategies – Comparing Strategy with State and Template Method. Extension Patterns: Introducing Extensions – Visitor.

UNIT V

Class Diagram – Object Diagram – Interaction Diagram. **Case Study1:**A reader for the RTF (Rich Text Format) document exchange format that converts RTF to many text formats such as RTF documents into a plain ASCII text or into a text widget that can be edited interactively. Design a class and object diagram for possible number of conversions. **Case Study 2:** A drawing editor which lets users to draw and arrange graphical elements (lines, polygons, text, etc.)Into pictures and diagrams. The drawing editor's key abstraction is the graphical object, which has an editable shape and can draw itself. The interface for graphical objects is defined by an abstract class called shape. The editor defines a subclass of shape for each kind of graphical object: I LineShape class for lines, a Polygon Shape class for polygon and so on....Illustrate a object adapter case.

Text Book:

- DESIGN PATTERNS IN JAVA – Software Patterns Series – Steven John Metsker, William C.Wake – 2nd edition – PEARSON EDUCATION.

Reference Book:

- DESIGN PATTERNS-Elements of Reusable Object-Oriented Software – Erich Gamma, Richard Helm, Ralp Johnson, John Vlissides – Addison Wesley Longman.

Course	Master of Computer Science						
Subject Code	23E	Subject Title	Elective II (C)Android Programming			Semester	II
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	4
For the Batch	2016 Onwards		Credits				4
Objective & Subject Description	On Successful completion of the course the students can develop different mobile applications using Android Operating System. The students can gather knowledge related to mobile computing and software.						

UNIT -I

What Is Android? - Obtaining the Required Tools- Creating Your First Android Application - Anatomy of an Android Application. Activities, Fragments, and Intents: Understanding Activities - Linking Activities Using Intents - Fragments - Calling Built - In Application Using Intents- Displaying Notifications.

UNIT - II

Getting to know the android user interface: Understanding the Components of a Screen- Adapting to Display Orientation - Managing Changes to Screen Orientation - Utilizing the Action Bar - Creating the User Interface Programmatically - Listening for UI Notifications Designing your user interface with views :Using Basic Views- Using Picker Views -Using List Views to Display Long Lists- List View - Understanding Specialized Fragments

UNIT - III

Displaying Pictures and Menus With Views: Using Image Views to Display Pictures - Using Menus with Views - Some Additional Views. Data Persistence: Saving and Loading User Preferences - Persisting Data to Files - Creating and Using Database .Content Provider: Sharing Data in Android - Using a Content Provider - Creating Your Own Content Providers - Using the Content Provider

UNIT - IV

Messaging: SMS Messaging - Sending E-Mail Location - Based Services: Displaying Maps - Getting Location Data - Monitoring a Location. Networking Consuming Web Services Using HTTP - Consuming JSON Services - Sockets Programming.

UNIT - V

Developing Android Services: Creating Your Own Services - Establishing Communication between a Service and an Activity - Binding Activities to Services - Understanding Threading - Publishing Android Applications: Preparing for Publishing - Deploying APK Files

Text Book:

1. Wei-Meng Lee, Beginning ANDROID 4 Application Development, Wiley publications, First Edition,2013.

Reference Books:

1. Wei- Meng Lee, "Beginning ANDROID Tablet Application Development", Wiley publications, First Edition,2 013.
2. Wallace Jackson, "Android Apps for Absolute Beginners, APRESS, 2nd edition, 2012.

**CMS COLLEGE OF SCIENCE & COMMERCE
(AUTONOMOUS)**

(Affiliated to Bharathiar University)

**An ISO 9001: 2008 Certified Institution and Re-accredited at the
'A' level with a CGPA of 3.53 out of 4 by NAAC
Chinnavedampatti, Coimbatore - 641 049**

Email: info@cmscbe.com

Website: www.cmscbe.com



Since 1988

M.Sc. (Computer Science)

DEPARTMENT OF COMPUTER SCIENCE

SYLLABUS

SCHEME OF EXAMINATION (CBCS)

2015 Onwards

DEPARTMENT OF COMPUTER SCIENCE REGULATIONS

INTRODUCTION

Applications of computer is one of the thrust areas in science and technology. In appreciation of its growing importance in business and visualizing the career prospects. The curriculum of this course is framed with theoretical concepts in computer applications and the students are capable of meeting the ever-changing challenges, having earnestly qualified themselves to be well ahead of time in the IT world.

The training imparted aims to prepare young minds for the challenging opportunities in the IT industry with a global awareness rooted in the Indian soil, nourished and supported by experts in the field.

OBJECTIVES

Visualizing on futuristic scenario the two years Master of Computer Science spotlights the era of mass diffusion of computers in IT world.

Four semesters, with one paper in the final semester being an exposure to the real-time project, the course magnifies the minds of the students to explore & push forward, enrich & enable their potential through ample logical reasoning, analytical ability and group discussions to make their way towards developing technical and managerial skills. In order to develop the caliber of each individual, students are trained in logical and lateral thinking to establish them as well-grounded individuals.

1. **Eligibility:** Candidates seeking admission to the first year course will be required to possess: A pass in B.Sc. (Computer Science/Electronics/Software Systems)/B.C.A./B.Sc. (Applied Science - Information Technology/ Computer Technology)/ B. Sc (CT / IT).
2. **Duration of the Course:** The course is offered on a full-time basis. The course consists of three semesters of course work and laboratory work and the fourth semester consists of a project work.
3. **Regulations:** The general Regulations of the Bharathiar University is Choice Based Credit System programme are applicable to this programme.
4. **The Medium of Instruction and Examinations:** The medium of instruction and Examinations will be in English.
5. **Practical Examinations & Project Work:** Candidates taking Practical Examinations and Project work should submit bonafide record note book and project report in the prescribed format. Defaulters will not be entertained for practical examination or project viva-voce.

DISTRIBUTION OF THE MARKS AND CREDITS UNDER CBCS

PART	SUBJECT	No of Papers	Marks @	Credits
III	Core Subjects	17\$	1700	68
	Elective Subjects	3	300	12
	Mini Project	1	50	2
	Project	1	200	8
IV	Extra Departmental Course (Self study)	1	100	4
	Total	23	2350	94

Note:

@ Includes 25/40 % continuous assessment marks for theory and practical subjects respectively.

\$ In core subjects both theory and practical should be included wherever applicable.

No Continuous Internal assessment for these subjects and no end semester Examinations

(Evaluation is based on the performance of Case study/field work...)

The following parameters are considered throughout study period.

- i) Regularity of Attendance
- ii) Active participation in classes/Camps/Games (College/District//University)
- iii) Exemplary awards/certificates/prizes
- iv) Other Social Components (Blood Camp, Fine Arts etc)

CMS COLLEGE OF SCIENCE& COMMERCE, COIMBATORE - 641 049**(Autonomous)****M.Sc. COMPUTER SCIENCE****SCHEME OF EXAMINATION - CBCS PATTERN**

(For the students admitted from the academic year 2015 Onwards)

Part	Sub code	Subject	Ins.hrs/ week	Examinations				Credit
				Dur. In hrs	CIA	ESE	Total marks	
Semester - I								
III	13A	Design and Analysis of Algorithms	5	3	25	75	100	4
III	13B	Distributed Operating System	5	3	25	75	100	4
III	13C	TCP/IP Networks	5	3	25	75	100	4
III	13D	J2EE Programming	5	3	25	75	100	4
III	13E	Elective I:	5	3	25	75	100	4
III	13P	J2EE Programming Lab	5	3	40	60	100	4
Semester - II								
III	23A	Expert Systems	4	3	25	75	100	4
III	23B	Advanced Data Structure	4	3	25	75	100	4
III	23C	C# Technologies	4	3	25	75	100	4
III	23D	Parallel Processing	4	3	25	75	100	4
III	23E	Elective II :	4	3	25	75	100	4
III	23P	C# Technologies Lab	5	3	40	60	100	4
III	23Q	Advanced Data Structure Lab	5	3	40	60	100	4

CMS COLLEGE OF SCIENCE& COMMERCE, COIMBATORE - 641 049**(Autonomous)****M.Sc. COMPUTER SCIENCE****SCHEME OF EXAMINATION - CBCS PATTERN**

(For the students admitted from the academic year 2015 onwards)

Part	Sub code	Subject	Ins.hrs/ week	Examinations				Credit
				Dur. In hrs	CIA	ESE	Total marks	
Semester - III								
III	33A	Pattern Recognition	5	3	25	75	100	4
III	33B	Cyber Security	4	3	25	75	100	4
III	33C	Data Mining and Data Warehousing	4	3	25	75	100	4
III	33D	Open Source Software	4	3	25	75	100	4
III	33E	Elective III :	4	3	25	75	100	4
III	33P	Pattern Recognition Lab	5	3	40	60	100	4
III	33Q	Open Source Software Lab	4	3	40	60	100	4
	33V	Mini Project and Viva Voce <i>(internal - 30 marks; external - 20 marks)</i>	-	-	-	50	50	2
Semester - IV								
III	43V	Project and Viva - Voce <i>(internal - 150 marks; external - 50 marks)</i>	-	-	-	200	200	8
		Total					2250	90

LIST OF GROUP ELECTIVE PAPERS

List of Elective Papers		
Elective - I	A	Data Compression
	B	Distributed Data Base Management Systems
	C	Enterprises Resource Planning
Elective - II	A	Soft computing
	B	Design Pattern in Java
	C	Software Project Management
Elective - III	A	Embedded System
	B	Digital Image Processing
	C	Object Oriented Analysis and Design

CMS COLLEGE OF SCIENCE & COMMERCE, COIMBATORE - 641 049.**(Autonomous)****Department of Computer Science****SCHEME OF EXAMINATION - CBCS PATTERN****EXTRA DISCIPLINARY COURSE (EDC)****(For the students admitted during the academic year 2015 Onwards)**

Part	Sub code	Subject	Ins.hrs/ week	Examinations				
				Dur. Exam in hrs	CIA	ESE	Total marks	Credit
Semester III								
IV		E-Commerce	-	3	25	75	100	4
Total			-	-	-	-	100	4

Note :

- The student has to compulsorily select one Extra Disciplinary Course offered by other departments and are eligible to get 4 extra credits. This paper is offered as a self study from the 2015 batch onwards.

Course	M.Sc. Computer Science						
Subject Code	33A	Subject Title	Pattern Recognition			Semester	III
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	5
For the Batch	2015 Onwards		Credits				4
Objective & Subject Description	On successful completion of the course the students should have understood the concepts of pattern recognition in clustering, Neural networks, and in images						

UNIT - I

Introduction: Application of Pattern Recognition - Statistical Decision Theory - Image processing and Analysis - Probability: Probabilities of events - Joint Distributions and Densities.

UNIT - II

Statistical Decision Making: Bayes Theorem - Nonparametric Decision Making: Histograms - Kernel and Window Estimators - Clustering: Hierarchical Clustering.

UNIT - III

Artificial Neural Networks: Introduction - Nets without Hidden Layers - Nets with Hidden Layers - The Propagation algorithm.

UNIT - IV

Processing of Waveforms and Images: Gray Level Scaling Transformations - Geometric Image Scaling and Interpolation - Edge Detection - Laplacian and Sharpening Operators - Line Detection and Template Matching.

UNIT - V

Image Analysis: Scene Segmentation - and Labeling - Counting Objects - Perimeter Measurement - Following and Representing Boundaries - Projections - Color.

Text Book :

1. Earl Gose, Richard Johnsonbaugh, Steve Jost - "Pattern Recognition and Image Analysis" - 2009 - Prentice Hall India.

Reference Book :

1. Richard O. Duda, Peter E. Hart, David G. Strok - "Pattern Classification" - Second Edition - Wiley Publication.
2. Robert Schelkoff - "Pattern Recognition, Statistical, Structural & Neural Approaches", 2007, Wiley - India.

Course	M.Sc. Computer Science						
Subject Code	33B	Subject Title	Cyber Security			Semester	III
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	4
For the Batch	2015 Onwards		Credits				4
Objective & Subject Description	On successful completion of the course the students should have understood the cyber security concepts.						

UNIT -I

Cyber security - Security: Threats to personal privacy - Fraud and Theft - Internet Fraud - Employee sabotage - Infrastructure attacks - Malicious hackers - Malicious code - Industrial Espionage. Security management: Foundations - Defense -in-depth strategy - Common Criteria Model - password management. Incident Handling: Types of Incidents - Incident handling process planning.

UNIT -II

Security Foundations: Access Control - Entities and Fundamentals of access control - Access Control Models - Access Control mechanisms - Uses of access control. Firewall and perimeters: Firewall environment - perimeter concepts - Intruders break in - understanding IP - TCP and ICMP Packets - proxy servers. Application Gateway: Firewall policy enforcement.

UNIT -III

VPNs and Remote Access: Historical evolution of VPN - VPN Basics - Needs of VPN - VPN Security essentials: Authorization - Authentication - VPN encryption. Intrusion Detection: Basic concepts. Types of IDS: Network - Host and Application based IDS - IDS structure - Core components - IDS Analysis - IDS response options - Host based vulnerability scanners.

UNIT-IV

Security Communications: Cryptography - Need - Strength - Basic Algorithm - Types of Cryptography - Cryptographic technique - cryptographic keys - Digital signatures - secret key and public key cryptographic - security Diligence: Testing concepts and applications - Diagnostic tests - key factors - security testing manual - Outsourced systems - monitoring and updating

UNIT -V

Security management Issues: organization security management - Areas of Responsibility - Basic approach to policy development - Security service level Agreements : Developing SLA - Components of an SLA. Adding security to SLA equation: General and computer security - Sensitive information - Risk assessment - Safeguards - Reporting - Monitoring and Audits.

Text Book:

1. John Rittinghouse, William M. Hancock - Cyber Security Operations Handbook, Digital Press (Elsevier), First Edition, 2005.

Reference Books:

1. Denzyl. P. Dayal - Cyber Terrorism and Hoaxes and Law Enforcement, Dominant publishers and Distributors, First Edition, 2005.
1. Douglas. E. Comer - Internetworking with TCP/IP -Principles, Protocols and Architecture, Prentice Hall India Publication, Fifth Edition, 2008.

Course	M.Sc. Computer Science						
Subject Code	33C	Subject Title	Data Mining and Data Warehousing			Semester	III
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	4
For the Batch	2015 Onwards		Credits				4
Objective & Subject Description		This subject provides an introduction about data mining related concepts, Spatial Mining, Temporal Mining and Data Warehousing.					

UNIT I:

Data Mining Related Concepts: Fuzzy Sets and Fuzzy Logic- Decision Support Systems-Dimensional Modeling. Web Mining: Web Content Mining-Web Structure Mining-Web usage Mining.

UNIT II:

Spatial Mining: Spatial Data Overview-Spatial Data Mining Primitives-Generalization and Specialization-spatial Rules-Spatial classification Algorithms-Spatial Clustering Algorithms

UNIT III

Temporal Mining: Introduction- Modeling Temporal Events-Time Series- Pattern Detection-Sequences-Temporal Association Rules.

UNIT IV:

Data Warehousing: Escalating Need for strategic Information-Failures of past Decision Support Systems-Operational Versus Decision Support Systems-Data Warehousing-Data Warehouse Defined. The Building Blocks: Defining Features-Data Warehouses and Data Marts-Overview of the Components-Metadata in the Data Warehouse-Significant Trends.

UNIT V:

The Significant Role of Metadata: Why Metadata is important-Metadata Types by functional Areas-Business Metadata-Technical Metadata-how to provide Metadata. Data Extraction, Transformation and Loading: ETL Overview-Data Extraction- Data Transformation-Data Loading.

Text Book :

1. Margaret H. Dunham, S.Sridhar, Data Mining, Introductory and Advanced Topics, Pearson Education, 2008.
2. Paulraj Ponniah, "Data Warehousing Fundamentals", Wiley India 2007.

Reference Books :

1. Arun K Pujari, Data Mining Techniques, Universities Press (India) Private Ltd, 2007.
2. G.K Gupta, Introduction to Data Mining with Case Studies, Prentice-Hall Of India Pvt. Limited, 2006.

Course	M.Sc. Computer Science						
Subject Code	33D	Subject Title	Open Source Software			Semester	III
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	4
For the Batch	2015 Onwards		Credits				4
Objective & Subject Description	This course presents the introduction to open source tools. This enables the students to learn the concepts of PHP AND MYSQL						

UNIT - I

What is PHP? Why use PHP? Embedding PHP with HTML, Enhancing further, PHP Language Basics: using variable in PHP, understanding Data types, operator and expressions. Making decisions: simple decision with if statements, switch, ternary operator, do..while loop, for statement, break, loop skip iteration, nested loop, Function: calling functions, working with variable functions, own functions references, recursive functions

UNIT - II

Arrays: creating and accessing array elements, looping through arrays, multidimensional array, manipulating array. Strings: creating and accessing strings, searching strings, replacing text within strings and formatting strings

UNIT - III

Handling HTML forms with PHP: HTML forms work, capture form data with PHP, multi value fields, web forms with PHP, storing PHP variables in forms, create file upload forms, redirecting PHP

UNIT - IV

Introducing Database and SQL : Deciding how to store data, quick play with MYSQL, connecting to MYSQL from PHP , retrieving data from MYSQL with PHP

UNIT - V

Manipulating MYSQL data with PHP insert, update, delete records. Working with files and directories: understanding files and directories, getting information on files, opening and closing files, reading files and writing files , file permissions, Copying ,renaming and deleting files, working with directories

Case Study: Building a text editor (to be given as assignment)

Text Book:

1. Matt Doyle , "Beginning PHP 5.3", Wunley India ,2012.

Reference Books:

1. Vikram Vaswani , PHP: A beginners Guide, Tata McGraw Hill,2009.
2. Law point, Guide to PHP, LP Computer series, 2007.
3. Larry Ullman , PHP 6 and MySQL 5, Pearson Education,2008.

Course	M.Sc. Computer Science						
Subject Code	33P	Subject Title	Pattern Recognition Lab			Semester	III
Internal Max:	40	External Max :	60	Total Marks	100	Hr. /Week	5
For the Batch	2015 Onwards		Credits				4

List of practicals

1. Write a program to recognize the input for XOR and produce the output
2. Write a program to convert black and white image into color
3. Write a program to change picture resolution.
4. Write a program to convert index image into binary image
5. Write a program to convert an image RGB into Gray
6. Write a program to resize of an image
7. Write a program to Deblurring images using regular filter.
8. Write a program to Draw a Bar charts.
9. Write a program to draw a plotting using graph function.
10. Write a program fro data expert in matlab to write the text into the files.
11. Write a program to change gridline styles.
12. Write a program to create image histogram.
13. Write a program to detect edges in objects in an image.
14. Write a program to apply filters to region of nearest an image.
15. Write a program to reduce noise in an object.

Course	M.Sc. Computer Science						
Subject Code	33Q	Subject Title	Open Source Software Lab			Semester	III
Internal Max:	40	External Max :	60	Total Marks	100	Hr./Week	4
For the Batch	2015 Onwards		Credits				4

List of practicals

1. Write a program to build a factorial calculator.
2. Write a program for Interactive HTML color sampler.
3. Design a HTML page and write a program for arithmetic operation in PHP using switch case.
4. Design and write a program to calculate average and grade of a class using arrays.
5. Write a program to manipulate string using different types of string function in PHP
6. Design and write a program to calculate age in years, months and days from the date of birth in PHP.
7. Write a program to access multi-dimensional array.
8. Create a web form in HTML that contain variety of form fields and display the values using PHP.
9. Design a web page and write a program to find number of hits in a web page.
10. Create employee database using MYSQL , insert records and display in neat format.
11. Design a login authentication system using PHP.
12. Design an online resume submission form using PHP.
13. Create a student mark list using PHP.
14. Write a PHP program to display patient details in a hospital.
15. Write a PHP program to display book details in a library.

Course	M.Sc. Computer Science						
Subject Code	33E	Subject Title	Elective III (A) - Embedded System			Semester	III
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	4
For the Batch	2015 Onwards		Credits				4
Objective & Subject Description	To introduce students to the embedded systems, its hardware and software. This subject deals with embedded systems and real time operating system.						

UNIT - I

Introduction to Embedded System: Embedded System - Processor embedded into system - Embedded Hardware Units -Embedded Software in a system -Complex system design and Processors - Design Process in embedded systems - classification of Embedded Systems - Skills required for Embedded System Designer.

UNIT - II

8051 and Advanced Processor Architectures: 8051 architecture - Real world interfacing - Introduction to advanced architecture: Architecture of Advanced Processors -Performance metrics.

UNIT - III

Devices and Communication buses for devices network: IO types and examples -Serial Communication devices - Parallel device ports - Sophisticated interfacing features in device ports - Wireless devices - Timer and counting devices - Networked embedded systems-Serial bus communication protocols: IC Bus - CAN Bus - USB Bus.

UNIT - IV

Inter-process Communication: Multiple process in an application - Multiple threads in an application - Tasks - Task states - Task and data - Concept of semaphores - Shared data - Inter-process communication - Signal function - Semaphore functions - Message queue functions - Mailbox functions - Pipe functions.

UNIT - V

Real Time Operating System: OS Services - Process Management - Timer Functions - Event Functions - Memory Management - Device, File and IO Subsystems Management: Device Management - Interrupt routines in RTOS environment and handling interrupt source calls - Real time operating systems - Basic design using an RTOS: Principles.

Text Book:

1. Rajkamal, Embedded Systems, Second Edition, Tata McGraw Hill, 2008.

Reference Books:

1. David Simon, Embedded systems software primer, Pearson Publication, 2009.
2. Frank Vahid, Embedded System design, PHI, 2007.

Course	M.Sc. Computer Science						
Subject Code	33E	Subject Title	Elective III (B) – Digital Image Processing			Semester	III
Internal Max:	25	External Max :	75	Total Marks	100	Hr./Week	4
For the Batch	2015 Onwards		Credits				4
Objective & Subject Description	On Successful completion of the course the students should have Understood the fundamentals of Digital Image Processing, Image Compression and Segmentation.						

UNIT I

Digital Image Fundamentals: Fundamental Steps in Image Processing –Components Of Image Processing System-Image Sampling and Quantization - Basic Relationships Between Pixels. Image Enhancement In Spatial Domain: Basic Gray Level Transformations - Histogram Processing -Enhancements Using Arithmetic/Logic Operations - basics of spatial Filtering Smoothing Filters - Sharpening Filters.

UNIT II

Image Enhancements in the Frequency Domain: Smoothing Filters - Sharpening Filters - Homomorphic Filters - Image Restoration: Degradation Model –Noise Models - Restoration in the Presence of Noise - Wiener Filter. Color Image Processing: Color Fundamentals - Color Models - Basics of Full Color Image Processing - Color Transformations.

UNIT III

Wavelets and Multi - Resolution Processing: Image Pyramids and Subband Coding-Wavelet transforming One Dimension - Fwt. Image Compressions: Fundamentals – Image Compression Models – Elements of Information Theory – Error – Free Compression – Lossy Compression – Image Compression Standards.

UNIT IV

Image Segmentation: Detection of Discontinuities – Edge Linking and Boundary Detection – Thresholding – Region Orientation Segmentation – Use of Motion In Segmentation.

UNIT V

Morphological Image Processing: Basic Binary Morphological Operations. Basic Grayscale Morphological Operations. Representation and Description: Representation–Boundary.

Text Book:

1. Rafael C. Gonzalez & Richard E. Woods, Digital Image Processing, Addison Wesley, Publication Corporation, 2005.

Reference Book:

1. Milan Sonka, Vaclav Hlavac, Roger, Image Processing Analysis, and Machine Vision, 2007.

Course	M.Sc. Computer Science						
Subject Code	33E	Subject Title	Elective III (C) – Object Oriented Analysis and Design		Semester	III	
Internal Max:	25	External Max :	75	Total Marks	100	Hr. /Week	4
For the Batch	2015 Onwards		Credits			4	
Objective & Subject Description		This Course presents the object oriented analysis and design emphasizing the software engineering aspects, methodologies in object oriented techniques. On successful completion of the course the students should have understood the trends and principles of object oriented methodologies and gained problem solving skills using developing object based models.					

UNIT I

Object Orientation – System Development – Review of Objects – Inheritance –Object Relationships – Dynamic binding – OOSD life cycle – Process – Analysis-Design - Prototyping – Implementation – Testing – Overview of Methodologies

UNIT II

OMT – Booch methodology, Jacobson – Methodology – patterns – Unified approach– UML – Class Diagrams – Dynamic Modeling

UNIT III

Using Case model – Creation of classes – Noun Phrase approach – responsibilities – Collaborators and relationships – Super – Sub class - Aggregation

UNIT IV

OO Design axioms – Class visibility – refining attributes- Methods – Access layer –OODBMS – Class mapping view layer

UNIT V

Quality Assurance testing – Inheritance and testing – Test Plan – Usability testing –User satisfaction testing

Text Books :

1. Ali Brahmi , “ Object Oriented System Development” , McGraw-Hill International Edition,2003 .
2. Object-Oriented Analysis and Design ,Grady Booch, Addison – Wesley,2004.

Reference Books :

1. Object Oriented Modelling and Design, James Rumbaugh , Micheal Blaha, Prentice Hall of India Ltd, 2002.
2. Object Oriented Programming, Cox Brand. J .Addison-Wesley, 2003.
3. Designing Object Oriented Software, Wirs Breck Rebecca, Prentice Hall of India Ltd, 2003.