Dr. M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
(Deemed to be University)
Maduravoyal, Chennai - 600 095. Tamilnadu. India.
(An ISO 9001 : 2015 Certified Institution)

CURRICULUM & SYLLABUS

(2018-REGULATION)

MASTER OF SCIENCE
COMPUTER SCIENCE

DEPARTMENT
OF
COMPUTER SCIENCE AND ENGINEERING/
INFORMATION TECHNOLOGY

DECLARATION

I, **Dr. S. GEETHA**, Head of Computer Science and Engineering Department, hereby declare that this copy of the syllabus (M.Sc. – Computer Science - 2018 Regulation) is the final version which is being taught in the class and uploaded in our University website. I assure that the Syllabi available in our University website is verified and found correct. The Curriculum and Syllabi have been ratified by our Academic Council / Vice Chancellor.

Date: **Signature**

Semester – I Theory					
Sub. Code	**Subject Name**	**L**	**T**	**P**	**C**
HMMA18021	Mathematical Foundation for Computer Science	3	1	0	4
HMCS18G01	Compiler Design	3	0	0	3
HMCS18G02	Advanced Data structures and Algorithms	3	0	0	3
HMCS18G03	Distributed Operating System	3	0	0	3
HMCS18G04	Advanced Java Programming	3	0	0	3
Practical					
HMCS18GLI	Advanced data structures and algorithms Lab	0	0	3	1
HMCS18GL2	Advanced Java Programming Lab	0	0	3	1
				1st Semester credits	18

Semester – II Theory					
Sub. Code	**Subject Name**	**L**	**T**	**P**	**C**
HMCS18G05	Advanced Microprocessors and Microcontrollers	3	0	0	3
HMCS18G06	Relational Database Management Systems	3	0	0	3
HMCS18G07	Computer Graphics	3	0	0	3
HMCS18G08	Object Oriented Analysis and Design	3	0	0	3
HMCS18G09	Networks and Security	3	0	0	3
Practical					
HMCS18GL3	Software System development Lab with IBM Rational ROSE	0	0	3	1
HMCS18GL4	Relational Database Management Systems Lab	0	0	3	1
				2nd Semester credits	17

Semester – III Theory					
Sub. Code	**Subject Name**	**L**	**T**	**P**	**C**
HMCS18G10	DOTNET Programming	3	1	0	4
HMCS18G11	XML and Web Services	3	0	0	3
HMCS18G12	Data Warehousing and Data Mining	3	1	0	4
HMCS18G13	Mobile and Wireless Networks	3	0	0	3
HMCS18EXX	Elective I	3	0	0	3
Practical					
HMCS18GL5	XML and Web Services Lab	0	0	3	1
HMCS18GL6	DOTNET Programming Lab	0	0	3	1
HMCS18P01	Project Phase –I	0	0	6	2
				3rd Semester credits	21

Semester – IV Theory					
Sub. Code	**Subject Name**	**L**	**T**	**P**	**C**
HMCS18G14	Software Testing and Quality Assurance	3	0	0	3
HMCS18EYY	Elective-II	3	0	0	3
HMCS18EZZ	Elective – III	3	0	0	3

Practical					
HMCS18P02	Project Phase –II	0	0	12	10
				4th Semester credits	19

Elective - I Theory					
Sub. Code	**Subject Name**	**L**	**T**	**P**	**C**
HMCS18E01	Machine Learning	3	0	0	3
HMCS18E02	Software Project Management	3	0	0	3
HMCS18E03	Artificial Neural Network	3	0	0	3

Elective - II Theory					
Sub. Code	**Subject Name**	**L**	**T**	**P**	**C**
HMCS18E04	TCP/IP & Internet	3	0	0	3
HMCS18E05	Image Processing	3	0	0	3
HMCS18E06	Cloud Computing	3	0	0	3

Elective - III Theory					
Sub. Code	**Subject Name**	**L**	**T**	**P**	**C**
HMCS18E07	Multimedia & Animation	3	0	0	3
HMCS18E08	E-Commerce	3	0	0	3
HMCS18E09	Digital Marketing	3	0	0	3

I Year - (I & II Sem) - 18 +17 = **35**

II Year - (III & IV Sem) - 21 +19 = **40**

Total Requirement = 75 Credits

SEMESTER – I

HMMA18021	**MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE**	**3**	**1**	**0**	**4**

UNIT I **9 3 0**

Logic: Statements - Connectives - Truth Tables - Normal forms - Predicate calculus - Inference Theory.

UNIT II **9 3 0**

Combinatorics: Review of Permutation and Combination - Mathematical Induction - Pigeonhole principle - Principle of Inclusion and Exclusion - generating function - Recurrence relations

UNIT III **9 3 0**

Algebraic structures: Semi group - Monoid – Groups (Definition and Examples only) Cyclic group - Permutation group (Sn and Dn) - Substructures - Homomorphism of semi group, monoid and groups - Cosets and Lagrange Theorem –Normal Subgroups - Rings and Fields (Definition and examples only)

UNIT IV **9 3 0**

Probability And Random Variable - Axioms of Probability – Conditional probability – Total probability – Baye's Theorem – Random variable – Probability mass function – Probability density function – Properties – Moments (Definition and simple problems).

UNIT V **9 3 0**

Standard Distributions - Binomial – Poisson – Geometric –Uniform – Exponential –Normal distributions.

Total Hours: 60

TEXT BOOKS:

1. J. P. Trembley, Manohar, Discrete Mathematical Structures with Applications to Computer Science, TMH
2. K.H. Rosen, "Discrete Mathematics and its Applications", McGraw - Hill Book Company,1999
3. Gupta S.C., Kapoor V.K., *Fundamentals of Mathematical Statistics*, S.Chand & Co., (2007).
4. Richard Johnson A., *Miller & Freund's Probability and statistics for Engineers (9th ed)*, Prentice Hall of India, (2016).

REFERENCES BOOKS:

1. Mott, Kandel & Baker, Discrete Mathematics for Computer Scientists & Mathematics 2nd Edition, PHI 2002
2.Veerarajan T., Probability, Statistics and, Random Processes, Tata McGraw Hill Publishing Co., (2008).
3. Singaravelu, Probability and Random Processes, Meenakshi Agency, (2017).

HMCS18G01	**COMPILER DESIGN**	**3**	**0**	**0**	**3**

UNIT I **9 0 0**

Introduction on the phase of the complier:Lexical Analysis, Regular Expression, Non deterministic Automata, Deterministic Automata equivalent to NFA's. 10 Minimizing the states of DFA, Implementation of Lexical Analyzer.

UNIT II **9 0 0**

Syntax Analysis : Top down Parsing Concepts, Recursive Descent Parsing, Predictive Parsers, Non recursive Predictive Parsing – Bottom Up Parsing, Handle pruning, Shift reduce parsing – Operator Precedence Parsing – Error recovery in Parsing, LR Parsers, Parser Generators – YACC.

UNIT III **9 0 0**

Intermediate Code Generation: Syntax directed Definitions, Construction of Syntax trees – Top down Translation, Bottom up Evaluation of inherited Attributed, Recursive Evaluators, Assigning Space at Complier Construction time – Type checking – Overloading of functions and operators Polymorphic function.

UNIT IV **9 0 0**

Storage Organization : Storage Organization, Storage Allocation Strategies,Parameter Passing, Symbol tables, Dynamic Storage Allocation, IntermediateLanguages – Representation of Declarations, Assignment Statement, BooleanExpression, Back patching, Procedure calls.

UNIT V **9 0 0**

Code Generation and Optimization: Design of the code generators, Runtime storage Management, Basic blocks and flow graphs, Register Allocation and Assignment, DAG representation of Basic blocks, Peephole optimization, Code optimization – The principle sources of optimization, Optimization of basic blocks, Global data flow Analysis, Loop optimizations.

Total Hours: 45

TEXT BOOKS :

1. Alfred Aho, Ravi Sethi, Jeffy D.Ullman, "Compilers – Principles, Techniques and Tools", 1986, Addison Wesley.
2. Dhamdhere D.M., "Compiler Construction Principles and Practice", 1981, Macmillan India.

REFERENCE BOOKS :

1. *Reinhard Wilhlm, Director Mauser, "Compiler Design", 1995, Addison Wesley*
2. *V Raghvan, " Principles of Compiler Design", TMH*

HMCS18G02	ADVANCED DATA STRUCTURES AND ALGORITHMS	3	0	0	3

UNIT I **9 0 0**

Introduction to data structures: Records, Arrays, Stacks, Queues, Recursion, Linked list, Binary tree and traversing.

UNIT II **9 0 0**

Sorting and Searching Techniques: Introduction, Internal and External Sorting, Insertion, Selection, Merging, Radix, Quick sort, Heap sort and Bubble sort. Searching: Introduction, Sequential search, Binary search, Binary Tree search.

UNIT III **9 0 0**

Graphs and Their applications: Introduction, Graph Theory, Terminology, Representation of graphs, Tree & Binary tree, operations on graphs, shortest path Algorithms, Topological sorting.

UNIT IV **9 0 0**

Algorithms: Development of Algorithms, basic concepts, Structured Program Concepts, Top down development of algorithms, Principle of analyzing Algorithms, Algorithms design methods, Sub goals, Hill climbing.

UNIT V **9 0 0**

Algorithms Design Techniques: Divide and Conquer algorithms, Dynamic Programming, Greedy algorithms, Backtracking and Branch & bound.

Total Hours: 45

TEXT BOOKS:

1. Seymour Lipschitz "Data Structures, Tata McGraw-Hill
2. Ellis Horowitz & S. Sahni, Fundamentals of Data Structures, Galgotia Pub

REFERENCE BOOKS :

1. Data Structures Using C - Langsam, Augenstien, Tenenbaum, PHI
2. Data structures and Algorithms, V.Aho, Hopcropft, Ullman , LPE
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem- TMH

HMCS18G03	**DISTRIBUTED OPERATING SYSTEM**	**3**	**0**	**0**	**3**

UNIT I **9 0 0**

Fundamentals: What is Distributed Operating System – Evolution of Distributed Computing System – Distributed Computing System Models –What is a Distributed Computing System – Issues in Designing Distributed Computing System – Introduction to Distributed Computing Environment. Introduction to Computer Networks.

UNIT II **9 0 0**

Message Passing: Introduction – Desirable features – Issues in PC Message Passing – Synchronization – Buffering – Multidatagram Messages – Encoding and Decoding – Process Addressing – Failure Handling – Group Communication

UNIT III **9 0 0**

Distributed Shard Memory: Introduction – General Architecture of DSM system – Design and Implementation Issues of DSM – Granularity – Structure of Shared Memory – Consistency Models – Replacement Strategy – Thrasing

UNIT IV **9 0 0**

Heterogeneous DSM – Advantages Synchronization: Introduction – Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithm

UNIT V **9 0 0**

Distributed File System: Introduction – Desirable features – File Models – File Accessing Models – File Sharing Semantics – File Caching Schemes – File Replication – Fault Tolerance – Atomic Transactions – Design Principles

Total Hours: 45

TEXT BOOKS:

1. Distributed Operating Systems – Concepts and Design, Pradeep K Sinha, PHI, 2003
2. Andrew S. Tanenbaum - Modern Operating System - Prentice Hall of India Pvt Limited,2001

REFERENCE BOOKS:

1. *Distributed Operating Systems 1e, Andrew S Tanenbaum, PHI.*
2. *Andrew S. Tanenbaum and Maarten Van Steen - Distributed Systems - Prentice Hall of India Pvt Limited, 2002*

HMCS18G04	ADVANCED JAVA PROGRAMMING	3	0	0	3

UNIT I **9 0 0**

Event Handling - Working with windows, Graphics and Text using AWT Classes - AWT Controls - Layout Managers and menus - Images. Introducing Swing: swing- components and containers - the swing packages - Painting in a Swing - Exploring Swing: Jlabel and ImageIcon - JtextField - The Swing Buttons - Jtabbed Pane - Jscroll Pane - Jlist - JcomboBox - Trees- Jtable.

UNIT II **9 0 0**

JDBC: JDBC Architecture - Installing the ODBC Driver - Connecting to a Database - Structured Query language. JDBC programming concept: Database URL - Executing the action commands - Query with JDBC - Populating a Database - Executing Queries - Metadata - Scrollable and Updatable Result Sets.

UNIT III **9 0 0**

Servlets: A simple Servlets - The servlet API - Servlet Package - Handling HTTP Request and Response. JSP : Evolution of the Web Application - Overview of the HTTP - Introduction to Servlets - JSP Overview - JSP syntax and semantics - Expressions, scriptlets and Declarations

UNIT IV **9 0 0**

Request Dispatching - Session and Thread Management - Application Event Listeners Database Access with JDBC.

UNIT V **9 0 0**

Networking Basics - Socket Programming - Proxy server - TCP/IP Sockets - Net address - datagrams.

Total Hours: 45

TEXT BOOKS:

1. Herbert Schildt - The Complete Reference Java - Tata McGraw Hill Publishing Company Limited Edition 7, 2007.
2. Cays Horstmann and Gary Cornell - Core Java Volume II, Pearson Edition, 2001

REFERENCE BOOKS:

1. P. Naoughton and H. Schildt - Java2: The Complete Reference - Tata McGraw Hill Publishing Company Limited, Edition 3, 1999.
2. Deitel & Deitel,"Java How to program", 8th ed., PHI.

HMCS18GLI	**ADVANCED DATA STRUCTURES AND ALGORITHMS LAB**	**0**	**0**	**3**	**1**

LIST OF EXPERIMENTS

1. Implement singly and doubly linked lists.
2. Represent a polynomial as a linked list and write functions for polynomial addition.
3. Implement stack and use it to convert infix to postfix expression
4. Implement a double-ended queue (dequeue) where insertion and deletion operations are possible at both the ends.
5. Implement an expression tree. Produce its pre-order, in-order, and postorder traversals.
6. Implement binary search tree.
7. Implement insertion in AVL trees.
8. Implement priority queue using binary heaps
9. Implement hashing with open addressing.
10. Implement Prim's algorithm using priority queues to find MST of an undirected graph.

List of Equipments and components

1. SOFTWARE REQUIRED – TURBOC version 3 or GCC version 3.3.4.
2. 2OPERATING SYSTEM – WINDOWS 2000 / XP / NT OR LINUX
3. COMPUTERS REQUIRED – 30 Nos. (Minimum Requirement : Pentium III or Pentium IV with 256 RAM and 40 GB harddisk)

HMCS18GL2	**ADVANCED JAVA PROGRAMMING LAB**	**0**	**0**	**3**	**1**

LIST OF EXPERIMENTS

1. Multithreading Using Priorities
2. File & String Manipulations
3. Write an Applet Program to use various Controls and perform Font Animation.
4. Create a menu with submenu, popup menu, short cut keys, check box items and separator.
5. Implement calculator using Java AWT controls.
6. Create a Student mark statement using JDBC control and display the information using Table.
7. Program to implement Client/Server technology.
8. Write a Java program to create an Employee pay bill calculation using various swing controls

SEMESTER – II

HMCS18G05	**ADVANCED MICROPROCESSORS AND M ICROCONTROLLERS**	**3**	**0**	**0**	**3**

UNIT I **9 0 0**

Microprocessor with Memory Management and Protection: Features of 80286 – Internal Architecture: Register organization – Internal block diagram - Interrupts – Real and Protected Virtual Addressing – Interfacing memory and I/O devices with 80286 – Addressing modes – Math Coprocessor.

UNIT II **9 0 0**

Beginning of 32-bit Microprocessors: Architecture of 80386 – Register organization – Addressing modes of 80386 – Data types – Concepts of addressing in real and protected modes – Segmentation and Paging – Conversion of a linear address to a Physical address – features of 80486 – Architecture and Register organization of 80486.

UNIT III **9 0 0**

Processors of new millennium: Salient features of Pentium 4 – Modules of Pentium 4 Architecture: Front end module, Out of order execution engine, Execution module, Memory subsystem module – Superscalar Execution – Pipelining –Hyperthreading in Pentium – RISC processors: Basic features and Advantages only.

UNIT IV **9 0 0**

Microcontrollers: Architecture of 8051 – Register set – Memory and I/O addressing – Interrupts – Six addressing modes – Ports of 8051 and their operation - Architecture of 16-bit microcontroller 80196.

UNIT V **9 0 0**

Embedded systems and Real Time Operating Systems (RTOS): Introduction to multitasking – simple Embedded multitasking systems – RTOS – Tasks in RTOS – Scheduling of tasks – Resource protection by Semaphore concept – Examples of Applications: Temperature Monitor (Tasks, Programming, Hardware requirements, Dealing with numbers) – A model Train Controller – Length measurement for rolling paper.

Total Hours: 45

TEXT BOOKS:

1. Advanced Microprocessors and Peripherals – A.K.Ray & K.M.Bhurchandi, TMH, 2nd Edition, 2007.
2. 8051 Microcontroller & Embedded systems – Rajiv Kapadia, Jaico Publishing House, 2006.

REFERENCE BOOKS:

1. An introduction to the design of small scale embedded systems – Tim Wilmshurst, Palgrave publishers, 2004.

2. *The 8051 Microcontroller and Embedded systems – Muhammad Ali Mazidi et al., - Pearson Education – 2nd Edition, 2006.*

HMCS18G06	**RELATIONAL DATABASE MANAGEMENT SYSTEMS**	**3**	**0**	**0**	**3**

UNIT I **9 0 0**

File System Vs. DBMS:Database System Applications - View of Data-Database language - Database design - ER Model _ Relational Model - Network Data Model - Hierarchical Data Model - Data Storage & Querying - Data Architecture.

UNIT II **9 0 0**

Relational Model: Structure of Relational Databases - Relational Algebra and Calculus - SQL - Basic Structure - Set Operations - Aggregate Functions - Null Values – Nested Queries - Complex Queries - Views - Modification of the Database - Advanced SQL - Triggers.

UNIT III **9 0 0**

Functional Dependencies :Features of Relational designs - Decomposition and Normalisation using Functional Dependencies and Multivalued Dependencies - Join dependencies- Domain key Normal form.

UNIT IV **9 0 0**

Recovery and atomicity - Failures Classification and types – Transaction model and Log based recovery – Schedules - Serial and Non Serial types-Serialization of schedules and views - locks based protocols – time based protocols - Validation techniques

UNIT V **9 0 0**

Distributed databases-Structures of distributed data bases –Tradeoffs in distributed the database –design of distributed the database –design of distributed database-Transparency and autonomy- distributed query proceeding Recovery in distributed system –commit protocols – security and integrity violations – authorization and views security specifications –Encryption- Statistical databases.

Total Hours: 45

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan- "Database System Concepts" , FifthEdition,McGraw-Hill,2006.
2. Narang,,"Database Management Systems", 2nd ed., PHI.

REFERENCE BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Tata McGraw-Hill Publishing Company, 2003.
2. Ramez Elmasri and Shamkant B. Navathe, "Fundamental Database Systems", Third Edition, Pearson Education, 2003.

HMCS18G07	COMPUTER GRAPHICS	3	0	0	3

UNIT I **9 0 0**

Overview: Video display devices – Raster and Random scan system – Input devices Output primitives: Points and Lines – Line drawing algorithms – Loading the frame buffer – Line function.

UNIT II **9 0 0**

Circle generating and Ellipse generating algorithm Pixel addressing and object geometry – Filled area primitives – Fill area function – Cell array – Character generation. **Attributes of output primitives**: Line attributes – Color and Grayscale levels – Area fill and Character attributes – Antialiasing. 2D Geometric transformations: Basic transformations – Composite – Reflection and Shear – Transformations between Coordinate systems.

UNIT III **9 0 0**

Affine transformations – Functions – Raster methods 2D Viewing: Viewing Pipeline – Coordinate reference frame – Window to Viewport – Viewing functions – Clipping operations – Line, Polygon, Text and Exterior clipping – GUI and Interactive input methods: User dialogue – Input of Graphical data – Input functions – Initial value – Picture construction – Virtual reality environments..

UNIT IV **9 0 0**

3D Concepts: Display methods Object Representations – Polygon surface – Curved lines and surface – Quadratic – Spline representation. 3D Geometric and Modeling transformations: Translation – Rotation – Scaling – Reflections – Shears – Composite transformations – functions. 3D Viewing: Pipeline – Coordinates – Projections – Clipping – Functions.

UNIT V **9 0 0**

Visible surface detection methods: Classification – Back face – Depth buffer – A buffer – Depth sorting – BSP – Area subdivision – Octree – Ray casting Color models and Applications: Properties of light – Standard primaries and Chromaticity diagram – RGB, YIQ, CMY, and HSV color models. Computer animations: Design – functions – Raster animations – Key frame systems – Motion specifications.

Total Hours:45

TEXT BOOK:

1. Donald Hearn M. Pauline Baker, "Computer Graphics", Second Edition, PHI Private Limited, 2004.

REFERENCE BOOKS:

1. F.S Hill, JR, "Computer Graphics using Open GL", Second Edition, PHI, 2005
2. R.G.S Asthana, N. K. Sinha, "Computer Graphics for Scientists and Engineers" Second Edition, New Age international Publishers, 2003

HMCS18G08	OBJECT ORIENTED ANALYSIS AND DESIGN	3	0	0	3

UNITI **9 0 0**

System Development - Object Basis - Development life cycle-Methodologies-Patterns-Frameworks-Unified Approach-UML.

UNITII **9 0 0**

Use-Case Models-Object Analysis-Object relations-Attributes-Methods-Class and object responsibilities-Case Studies.

UNITIII **9 0 0**

Design Process-Design Axioms-Class Design-Object storage-Object Interpretability-Case Studies.

UNITIV **9 0 0**

User interface design-View layer classed-Micro-level processes-View Layer Interface-Case Studies.

UNITV **9 0 0**

Quality Assurance Tests-Testing strategies-Object oriented on testing-Test Cases-Test Plans-Continuous testing-Debugging Principles-System usability-Measuring user satisfaction-Case Studies.

Total Hours: 45

TEXT BOOK:

1. Ali Bahrami, “Object Oriented Systems Development”, McGraw Hill International Edition, 1999

REFERENCE BOOKS:

1. *Grady Booch, “Object Oriented Analysis and Design”, Pearson Education-2nd Edition*
2. *Matha,”Object-Oriented Analysis and Design using UML”,PHI*

HMCS18G09	NETWORKS AND SECURITY	3	0	0	3

UNIT I Introduction 9 0 0

OSI reference model – Data link Layer: Design Issues – Error Detection and Correction – Elementary protocol, Sliding window protocols, Protocol Verification. MAC sub layer: Channel allocation multiple access protocol.

UNIT II Network Layer 9 0 0

Design issues – Circuit switching – Packet switching – Virtual circuit switching – Routing algorithms – Congestion control algorithms – Internetworking – Network layer in Internet – IPV6

UNIT III Transport Layer 9 0 0

Design issues – Transport protocols – Simple transport protocol – Internet transport protocols UDP, TCP – Flow Control – Congestion control – Congestion avoidance

UNIT IV Application Layer 9 0 0

Domain name system – Electronic mail – World Wide Web – HTTP – SNMP – Telnet – FTP. Security : Introduction – Symmetric Ciphers : Classical Encryption Techniques – Block Ciphers and the Data Encryption Standard – Advanced Encryption Standard Encryption.

UNIT V Public Key Encryption and Hash Functions 9 0 0

Public Key Cryptography and RSA –Elliptic Curve Cryptography – Message Authentication and Hash Functions –Hash and MAC Algorithms – Digital Signatures and Authentication Protocols.

Total Hours : 45

TEXT BOOKS:

1. Andrew S. Tanenbaum (2010) Computer Networks, (5th ed), PHI
2. William Stallings (2011) Cryptography and Network Security – Principles and Practices, (5th ed). Pearson Education

REFERENCE BOOKS:

1. *Behrouz Forouzan, TCP / IP Protocol Suite, Fourth Edition, TMGH, 2010*
2. *Uyless Black, Computer Networks, Second Edition, PHI, 2005*

HMCS18GL3	**SOFTWARE SYSTEM DEVELOPMENT LAB WITH IBM RATIONAL ROSE**	**0**	**0**	**3**	**1**

LIST OF EXPERIMENTS

Develop the following software using software Engineering methodology:

1. Online Railway reservation system
2. Simulator software for parallel processing operation
3. Payroll processing application
4. Inventory system
5. Simulator software for compiler operation
6. Automating the Banking process
7. Software for game
8. Library management system
9. Text editor
10. Create a dictionary
11. Telephone directory
12. Create an E- Book of your choice.

SOFTWARE REQUIRED:

Languages: C/C++/JDK 1.3, JSDK, WEB BROWSER & UML Any Front End Tools (Like VB, VC++, Developer 2000) Any Back End Tools (Like Oracle, MS-Access, SQL)

HMCS18GL4	**RELATIONAL DATABASE MANAGEMENT SYSTEMS LAB**	**0**	**0**	**3**	**1**

LIST OF EXPERIMENTS

1. Creating database tables and using data types.
   • Create table, • Modify table, • Drop table
2. Practical Based on Data Manipulation.
   • Adding data with Insert, • Modify data with Update,• Deleting records with Delete
3. Practical Based on Implementing the Constraints.
   • NULL and NOT NULL, • Primary Key and Foreign Key Constraint• Unique, Check and Default Constraint
4. Practical for Retrieving Data Using following clauses.
   • Simple select clause, • Accessing specific data with Where, Ordered By, Distinct and Group By
5. Practical Based on Aggregate Functions.
   • AVG, • COUNT, • MAX, • MIN, • SUM, • CUBE
6. Practical Based on implementing all String functions.
7. Practical Based on implementing Date and Time Functions.
8. Practical Based on implementing use of union, intersection, set difference.
9. Implement Nested Queries & JOIN operation.
10. Practical Based on performing different operations on a view.
11. Practical Based on implementing use of triggers, cursors & procedures.
12. Make a Database connectivity with front end tools like – VB, VC++

SEMESTER – III

HMCS18G10	**DOTNET PROGRAMMING**	**3**	**1**	**0**	**4**

UNIT I **9 3 0**

Introduction to .NET - .NET Defined – The .NET Framework - Visual Basic .NET. VB6 and VB .NET Differences – Data Type Changes- Arrays- Operators- User Defined Types- Null Values, Variables- Procedures- Properties- Control Flow- Form-based Application Changes- Application Types- Data Access- Object Oriented Programming and VB .NET – Encapsulation- Inheritance, Polymorphism - Data Types, Variables, and Operators – Arrays –Conditional Logic.

UNIT II **9 3 0**

Procedures - Dialog Boxes – Introduction to Dialog Boxes- File IO and System Objects – Directory object - Error Handling –Namespaces –Classes and Objects –Multithreading.

UNIT III **9 3 0**

Data Access – Introduction to Data Access in .NET - ADO.NET - Data Access in Visual Studio .NET – Visual Studio .NET Database Tools, Visual Studio .NET and ADO.NET - Visual Studio .NET and XML - Manipulating XML in Code - Windows Forms – Introduction to System.Windows.Form - Controls – Specific Controls – Base Controls, Derived Controls, Display Controls, Dialog Controls, Miscellaneous Controls.

UNIT IV **9 3 0**

"Visual" Inheritance – Irregular Forms – Other Namespaces and Objects in the Catalog – Introduction to Web Development - Introduction to ASP.NET - Page Framework – HTML Server Controls.

UNIT V **9 3 0**

Web Controls – Validation Controls –User Controls –Events – Cascading Style Sheets –State Management – ASP.NET Applications – Creating Web Application, Deleting an Application, global.asax, Understanding web.config.

Total Hours: 60

TEXT BOOKS:

1. Bill Evjen, Jason Beres, et al, "Visual Basic .NET Programming", Wiley India Publication,2002 – Chapters 1-15,21-41.
2. Steven Holzner, Visual Basic .NET Programming Black Book , Dreamtech Press.

REFERENCE BOOKS:

1. David Chappell, Understanding .NET , Pearson education, 2002

2. David.S.Platt, Introducing Microsoft .Net , PHI, 2003.

HMCS18G11	XML AND WEB SERVICES	3	0	0	3

UNIT I **9 0 0**

Introduction: Role Of XML – XML and The Web – XML Language Basics – SOAP – Web Services – Revolutions Of XML – Service Oriented Architecture (SOA).

UNIT II **9 0 0**

XML Technology: XML – Name Spaces – Structuring With Schemas and DTD – Presentation Techniques – Transformation – XML Infrastructure.

UNIT III **9 0 0**

SOAP : Overview Of SOAP – HTTP – XML-RPC – SOAP: Protocol – Message Structure – Intermediaries – Actors – Design Patterns And Faults – SOAP With Attachments.

UNIT IV **9 0 0**

Web Services: Overview – Architecture – Key Technologies - UDDI – WSDL – ebXML – SOAP And Web Services In E-Com – Overview Of .NET And J2EE.

UNIT V **9 0 0**

XML Security: Security Overview – Canonicalization – XML Security Framework – XML Encryption – XML Digital Signature – XKMS Structure – Guidelines For Signing XML Documents – XML In Practice.

Total Hours: 45

TEXT BOOKS:

1. Frank. P. Coyle, XML, Web Services And The Data Revolution, Pearson Education, 2002.
2. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services - An Architect's Guide" Pearson Education– Second Indian Reprint 2005.

REFERENCE BOOKS:

1. *Eric Newcomer, Greg Lomow, Understanding SOA with Web Services, , Pearson Education, First Indian Reprint 2005.*
2. *Keith Bellinger,.NET Web Services Architecture and Implementation,Pearson Education*

HMCS18G12	**DATA WAREHOUSING AND DATA MINING**	**3**	**1**	**0**	**4**

UNIT I Data Warehousing 9 3 0

System process Overview-Process Architecture-Load Manager-Warehouse manager-Query Manager-Data Marting -Metadata.

UNIT II Database Schema 9 3 0

Database Schema-Star flake Schemas-Identifying facts and dimensions-Designing fact tables- Designing dimension tables-Partitioning Strategy

Unit III Introduction 9 3 0

Relational Databases-Transactional databases-Advanced Database System-Data mining Functionalities-Concepts-Class description-Association Analysis-Classification
and prediction- Analysis.

Unit IV Data pre-processing 9 3 0

Data Cleaning –Missing Values-Noisy Data-Inconsistent Data-Data Integration and Transformation-Data Reduction-Data Cube Aggregation-Dimensionality Reduction-Data Compression-Numerosity Reduction-Discretization and concept

Unit V Data Mining Primitives, Classification And Prediction 9 3 0

Data mining Primitives –Task Relevant Data-background Knowledge-Concept hierarchies- Presentation and Visualization of discovered pattern-Issues regarding classification and prediction-Prediction-Classification by decision trees- Induction-Tree Pruning-Extract classification rules and decision trees.

TEXT BOOKS:

1. Sam Anahory,Dennis,Murray , Data Warehousing in the Real World, Pearson Education,Asia,2005
2. Jiawei Han ,Micheline Kamber, ”Data Mining: Concepts and Techniques”, Morgan Kaufmann Publishers,II Edition 2006.

REFERENCE BOOKS:

1. *Usama M.Fayyad ,Gregory Piatetsky – Shapiro, Padhrai Smyth and Ramasamy Uthurusamy,” Advances in Knowledge Discovery and Data Mining”, the M.I.T Press ,1996.*
2. *Ralph Kimball ,”The Data Warehouse Life Cycle Toolkit”, John Wiley & Sons Inc.,1998*
3. *Sean Kelly ,”Data Warehousing in Action”, John Wiley &Sons Inc.,1997*

HMCS18G13	MOBILE AND WIRELESS NETWORKS	3	0	0	3

UNIT I COMMUNICATION FUNDAMENTALS 9 0 0

Introduction - Wireless Transmission - Frequencies for Radio Transmission - Signals - Signal propagation - Multiplexing , Modulation - Spread spectrum - Cellular systems.

UNIT II MAC AND COMMUNICATION SYSTEMS 9 0 0

OSI Model - Functions , Medium access control - FDMA-TDMA-CDMA. Telecommunication systems - GSM-UMTS and IMT-2000, Satellite systems - Broadcast systems - Data Digital Audio Broadcasting - Digital Video Broadcasting.

UNIT III WIRELESS STANDARDS 9 0 0

Wireless LAN - Infrared vs. Radio Transmission - Infra structure and ad hoc Networks - HIPERLAN - Bluetooth. Wireless ATM - Services - Radio Access Layer - Handover - Location Management - Addressing - Mobile Quality of Service - Access Point Control Protocol.

UNIT IV MOBILE NETWORK ISSUES 9 0 0

Mobile network layer - Mobile IP - Dynamic host configuration protocol - Ad hoc networks-Routing Algorithm-Mobile transport layer - Traditional TCP - Indirect TCP - Snooping TCP, Mobile TCP - Selective Retransmission - Transaction Oriented TCP.

UNIT V MOBILE APPLICATIONS 9 0 0

Support for Mobility - File systems - Consistency - World wide web - Hyper Text Transfer Protocol - Hypertext markup language –Next generation- Wireless Application Protocol.

Total Hours: 45

TEXT BOOKS:

1. Jochen Schiller, (2008) Mobile Communications (2nd ed.), Pearson Education
2. Blake (2002) Wireless Communication Technology,Thomson Learning

REFERENCE BOOK:

1. Theodore S.Rappaport (2010) Wireless Communication: Principles and practice, Prentice Hall

HMCS18GL5	**XML AND WEB SERVICES LAB**	**0**	**0**	**3**	**1**

1. XML Document Creation
2. Importing and Exporting XML Document in Database
3. XSL Transformation
4. (a) Internal DTD Creation
   (b) External DTD Creation
5. XML Schema Creation
6. Parsing XML Document Using DOM/SAX Parser
7. (a) Web Service Creation Using JAX-WS For Currency Conversion
   (b) Web Service Creation Using JAX-WS For Temperature Conversion
8. Web Service Creation Using JAX-RS
9. (a) Web Service Creation Using .NET For Currency Conversion
   (b) Web Service Creation Using .NET For Temperature Conversion
10. (a) JAXB Marshaling
    (b) JAXB UnMarshaling

HMCS18GL6	**DOT NET PROGRAMMING LAB**	**0**	**0**	**3**	**1**

LIST OF EXPERIMENTS

A. Implement the following using VB.NET

1. Creating and using Variables, Arrays and Structure
2. Creating and using Procedures
3. Using Decision Structures
   a. Checking User Input b. Confirming Application Close
4. Implementing Structured Exception Handling
5. Creating Menus , Status Bars and Toolbars
6. Create and open a connection to a database using ADO.NET
7. Create, read, update, and delete records in a database using ADO.NET

B. Implement the following using ASP.NET

1. Create a master page to serve as a template for the Web site's pages.
2. Create a admin page with an editable master-detail view for browsing, inserting, updating, and deleting records.
3. Create a simple web site
4. Create and open a connection to a database using ADO.NET
5. Create, read, update, and delete records in a database using ADO.NET
6. Use SqlDataSource to populate a DropDownList and GridView
7. Use ObjectDataSource to Populate a GridView
8. Create a feedback form.

SEMESTER – IV

HMCS18G14	SOFTWARE TESTING AND QUALITY ASSURANCE	3	0	0	3

UNIT I **9 0 0**

Principles of Testing – Software Development Life Cycle Models

UNIT II **9 0 0**

White Box Testing-Integration Testing-System and acceptance testing.

UNIT III **9 0 0**

Testing Fundamentals -2 & Specialized Testing: Performance Testing-Regression testing-Testing of Object Oriented Systems-Usability and Accessibility Testing-Software testing- Validation – Test plan – Test cases - Test Generation

UNIT IV **9 0 0**

Test Planning, Management, Execution and Reporting. Equivalence partitioning – Boundary value analysis – Category partition method – Combinatorial generation - Decision tables – Examples and Case studie

UNIT V **9 0 0**

Software Test Automation-Test Metrics and Measurements-Testing for specific attributes: Performance, load and stress testing – Usability testing – Security testing - Test automation – Test oracles

Total Hours : 45

TEXT BOOKS:

1. Software Testing -Srinivasan Desikan, Gopalaswamy Ramesh, Pearson Education 2006.
2. Naik and Tripathy "‚Software Testing and Quality Assurance" Wiley.

REFERENCE BOOKS:

1. *Introducing Software testing-Louis Tamres, Addison Wesley Publications, First Edition.*
2. *Software testing, Ron Patten, SAMS Techmedia, Indian Edition 2001.*
3. *Stephen H. Kan, "Metrics and Models in Software Quality Engineering", 2nd Edition, Pearson, 2003*
4. *Kshirasagar Naik and Priyadarshi Tripathy (Eds), "Software Testing and Quality Assurance: Theory and Practice", John Wiley, 2008*

LIST OF ELECTIVES

ELECTIVE - I

HMCS18E01	**MACHINE LEARNING**	**3**	**0**	**0**	**3**	

UNIT I Introduction to machine learning 9 0 0

Machine Learning – Machine learning applications – learning association – supervised learning – learning a class from examples – learning multiple classes – regression – model selection and generation – Bayestan decision theory – losses and risk – discriminant functions – association rules.

UNIT II Parametric and Multivariate Methods 9 0 0

Parametric methods – maximum likelihood estimation – Baye's estimator – parametric classification – regression – tuning model – multivariate methods – multivariate data – multivariate normal distribution – multivariate regression – dimensionality reduction – subset selection – factor analysis – multidimensional scaling – Isomap

UNIT III Clustering and Nonparametric methods 9 0 0

Clustering - Mixtures densities – k mean clustering – special and hierarchal clustering – Nonparametric density estimation – generalization to multivariate data – nonparametric classification – outlier data – decision trees – univariate trees – pruning – rule extraction from trees – multivariate trees.

UNIT IV Linear Discrimination and Multilayer Perceptrons 9 0 0

Linear discrimination – generalizing the linear model – pair wise separation – logistic discrimination – discrimination by regression – multilayer preceptrons – MLP – back propagation algorithms – training procedures – tuning – dimensionality reduction – deep learning – local models – competitive learning – radial basis – normalized basis – learning vector quantization - mixture of experts.

UNIT V Kernel machines and Graphical models 9 0 0

Kernel machine – optimal separating hyper plane – v SVM – multiple kernel learning – large margin nearest neighbour classifier – graphical models – generative models – d Separation -
belief propagation – Hidden morkov models – Bayesten estimation – combining multiple learners – reinforcement learning.

Total Hours: 45

TEXT BOOK:

1. Ethem Alpaydin, "Introduction to Machine Learning" 3rd Edition PHI- 2014
2. Snila Gollapudi, "Practical Machine Learning" PACKT – 2016

REFERENCE BOOKS:

1. *Tom M Mitchell, "Machine Learning" McGraw-Hill – 2013*
2. *David Barber "Bayesian Reasoning and Machine Learning" Cambridge University Press – 2015.*

HMCS18E02	SOFTWARE PROJECT MANAGEMENT	3	0	0	3

UNIT I **9 0 0**

Software management renaissance: Conventional Software Management – Evolution of Software Economics – Improving Software Economics – The Old Way and the New.

UNIT 1I **9 0 0**

A software management process framework: Live-Cycle Phases – Artifacts of the Process – Model-Based Software Architectures – Work Flows of the Process – Check Points of the Process.

UNIT III **9 0 0**

Software management disciplines – I: Iterative Process Planning – Project Organizations and Responsibilities – Process Automation.

UNIT 1V **9 0 0**

Software management disciplines – II: Project Control and Process Instrumentation – Tailoring the Process

UNIT V **9 0 0**

Risk management: Introduction – Risk – Categories of risk – A framework for dealing with risk – Risk Identification – Risk assessment – Risk Planning – Risk Management – Evaluating risks to schedule – Applying the PERT Technique – Monte Carlo Simulation – Critical Chain Concepts

Total Hours: 45

TEXT BOOKS:

1. "Software Project Management" - Walker Royce - Pearson Education
2. "Software Project Management" - Bob Hughes & Mike Cotterell - Fourth Edition - 2008 - ISBN: 978 - 0 - 07 - 061985-2

REFERENCE BOOKS:

1. *Bob Hughes and MikeCotterell "Software Project Management", Third Edition, TATA McGraw Hill Edition 2004.*
2. *Ramesh, Gopalaswamy: "Managing Global Projects ", Tata McGraw Hill, 2001.*

HMCS18E03	ARTIFICIAL NEURAL NETWORK	3	0	0	3

UNIT I **9 0 0**

Introduction: Trends in computing – Pattern and data – Pattern Recognition tasks – Methods for pattern recognition tasks – Basics of Artificial Neural Networks- Characteristics of Neural Networks -/ANN Terminology – Models of Neuron – Topology – Basic Learning Laws

UNIT II **9 0 0**

Activation and Functional Units: Activation Dynamics Models – Synaptic Dynamic Models – Learning Methods – Stability and convergences – Recall in Neural Networks – Pattern Recognition Problem – Basic Functional Units – Pattern Recognition Tasks by the functional Units.

UNIT III **9 0 0**

Feedforward and Feedback Neural Networks: Analysis of pattern Association Networks - Analysis of pattern Classification Networks - Analysis of pattern Mapping Networks - Analysis of Linear Autoassociative FF Networks – Analysis of Pattern Storage Networks – Stochastic Networks and Simulated Annealing – Boltzmann Machine

UNIT IV **9 0 0**

Competitive Learning and Architecture for complex Pattern: Components of a competitive Learning Networks – Analysis of Feedback Layer – Analysis of Pattern Clustering Networks – Analysis of Feature Mapping Network – Associative Memory – Pattern Mapping – Stability-Plasticity Dilemma:ART - Temporal Patterns – Pattern Variability

UNIT V **9 0 0**

Application of ANN: Direct Applications – Pattern Classification - Recognition of printed characters – Associative memories -optimization - Application area – Generalization in Neural Networks – Principle Components of Neural Networks – Trends in Neural Networks

Total Hours: 45

TEXT BOOKS:

1. Artificial Neural Network – B. Yegnanarayana – Printice-Hall
2. Artificial Neural Network – Robert J Schalkoff– McGrawHill

REFERENCE BOOKS:

1. *Artificial Neural Network: A Practical Course – Ivan Nunes da Sliva et al – Springer*
2. *Neural Network : A Systematic Introduction – Raul Rojas - Springer*

ELECTIVE - II

HMCS18E04	**TCP / IP AND INTERNET**	**3**	**0**	**0**	**3**

UNIT I **9 0 0**

Introduction and Overview.: Comparison of OSI Model and TCP/IP model. Networking Technologies: LANS, WANS, Connecting Devices. Internetworking concept and Architectural model. Internet Backbones, NAP, ISP's, RFC's, Internet Standards.

UNIT II **9 0 0**

Internet Addresses: IP address classes, subnet mask, CIDR, ARP,RARP, Internet Protocol, Routing IP Datagrams, ICMP and IGMP.

UNIT III **9 0 0**

UDP, TCP, Sockets and socket Programming, Routing in Internet, Routing protocols- RIP, OSPF and BGP. Introduction to Multicasting and Multicast routing.

UNIT IV **9 0 0**

Host Configuration: BOOTP, DHCP; Services: Domain Name System, FTP, TFTP and Electronic Mail: SMTP, MIME, IMAP, POP.

UNIT V **9 0 0**

Network Management: SNMP, WWW: HTTP, Mobile IP. Multimedia : RTP, RTCP. **Middlewares** : RPC, RMI. Introduction to IPv6 and ICMPv6, Internet Security:IPSec, PGP, Firewalls, SSL.

Total Hours: 45

TEXTBOOKS:

1) Internetworking and TCP/IP: Principles, Protocols and Architectures, Douglas Comer, Pearson Education.
2) TCP/IP Protocol suite, Behrouz A. Forouzan, Third Edition, TMH.

REFERENCE BOOKS:

1. *Stevens W. R. TCP/IP Illustrated, volume 1,2,3, Pearson education.*
2. *Computer Networking – A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W. Ross, Pearson Education, Asia.*
3. *Computer Networks: A systems approach by Larry L. Peterson and Bruce S. Davie, 3rd Edition, Morgan Kaufmann Publishers*

HMCS18E05	**IMAGE PROCESSING**	**3**	**0**	**0**	**3**

UNIT I INTRODUCTION 9 0 0

Digital image representation-Fundamental steps in image processing -Elements of digital image processing systems, Digital Image Fundamentals - :Elements of visual perception-A simple image model -Sampling and quantalization -Some basic relationship between pixels Imaging geometry -Photographic film.

UNIT II IMAGE TRANSFORMS 9 0 0

Introduction to the Fourier transform -The Discrete Fourier transform -Some properties of the two dimenstional Fourier transform -The fast Fourier transform-Other seperable image transforms-The hotelling transform.

UNIT III IMAGE ENHANCEMENT 9 0 0

Background -Enhancement by point Processing -Spatial filtering-Enhancement in the frequency domains -Generations of the spatial masks from frequency Domain specifications Color image processing -Image Restoration: Degradation Model -diagonalization of Circulant and Block circulant Matrices -Algebraic approach to restoration-Inverse filtering -Least mean square filter -constrained least square restoration-Restoration in spatial domain-Geometric transformation.

UNIT IV IMAGE RESTORATION AND SEGMENTATION 9 0 0

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection –- Morphological processing- erosion and dilation - Thresholding - Region - Oriented segmentation - The use of motion in segmentation.

UNIT V WAVELETS AND IMAGE COMPRESSION 9 0 0

Wavelets – Subband coding - Multiresolution expansions - Compression: Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards

Total Hours: 45

TEXT BOOKS:

1. RAFAEL C.GONZALEZ and RICHARD E.WOODS. Digital Image Processing - 2008, Prentice Hall, 3rd Edition.
2. M.A.SID AHMAED, Image Processing Theory, Algorithm and Architecture - McGraw Hill, 1995
3. Fundamentals of Digital Image Processing by Anil K Jain
4. Digital Image Processing by William K Pratt

HMCS18E06	**CLOUD COMPUTING**	**3**	**0**	**0**	**3**

UNIT I **9 0 0**

Introduction: Essentials, Benefits and need for Cloud Computing - Business and IT Perspective - Cloud and Virtualization - Cloud Services Requirements - Cloud and Dynamic Infrastructure - Cloud Computing Characteristics Cloud Adoption.

Cloud Models: Cloud Characteristics - Measured Service - Cloud Models - Security in a Public Cloud Public versus Private Clouds - Cloud Infrastructure Self Service

UNIT II **9 0 0**

Cloud Solutions: Cloud Ecosystem - Cloud Business Process Management - Cloud Service Management - Cloud Stack - Computing on Demand (CoD) – Cloud sourcing.

Cloud Offerings: Information Storage, Retrieval, Archive and Protection - Cloud Analytics Testing under Cloud - Information Security - Virtual Desktop Infrastructure - Storage Cloud.

UNIT III **9 0 0**

Cloud Management: Resiliency – Provisioning - Asset Management - Cloud Governance - High Availability and Disaster Recovery - Charging Models, Usage Reporting, Billing and Metering.

UNIT IV **9 0 0**

Cloud Virtualization Technology: Virtualization Defined - Virtualization Benefits - Server Virtualization.

Cloud Virtualization: Storage virtualization - Storage Area Networks - Network-Attached storage - Cloud Server Virtualization - Virtualized Data Center.

UNIT V **9 0 0**

Cloud and SOA: SOA Journey to Infrastructure - SOA and Cloud - SOA Defined - SOA and IaaS - SOA-based Cloud Infrastructure Steps - SOA Business and IT Services.

Cloud Infrastructure Benchmarking: OLTP Benchmark - Business Intelligence Benchmark - e-Business Benchmark - ISV Benchmarks - Cloud Performance Data Collection and Performance Monitoring Commands - Benchmark Tools.

Total Hours: 45

TEXT BOOKS:

1. Cloud Computing – Insight into New Era Infrastructure, Dr. Kumar Saurabh, Wiley India.
2. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Wiley

REFERENCE BOOKS:

1. *Cloud Computing, Roger Jennings, Wiley India*

2. *Cloud Computing Explained, John Rhoton, Recursive Press*

ELECTIVE - III

HMCS18E07	**MULTIMEDIA AND ANIMATION**	**3**	**0**	**0**	**3**

UNIT I **9 0 0**

Definition-Taxonomy-Multimedia Information Representation-Text-Images-Audio-Video-Multimedia Architecture-Multimedia Applications-Challenges of Multimedia Systems.

UNIT II **9 0 0**

Compression Principles-Need for Compression-Redundancy and Visibility-Text Compression-Binary Image Compression-Color, Gray Scale and Still-Video Image Compression-Audio Compression-Video Compression.

UNIT III **9 0 0**

Data and File Formats-RTF,TIFF,RIFF,MIDI,JPEG,AVI Video File Formats-MPEG standards-TWAIN Architecture-Digital Audio and Video as Multimedia I/O Technology-Animation.

UNIT IV **9 0 0**

Multimedia Application Design-Virtual Reality-Organizing Multimedia Databases- Application Workflow Design Issues-Distributed Application Design Issues.

UNIT V **9 0 0**

Multimedia Presentation and Authoring-Hypermedia Messaging-Multimedia in Future : High Definition Television and Desktop Computing-Knowledge Based Multimedia Systems.

Total Hours: 45

TEXTBOOKS:

1.Prabhat K. Andleigh and Kiran Thakrar, Multimedia System Design, Pearson Education.
2.Ralf Steinmetz and Klara Nahrstedt, Multimedia Computing, Communications and Applications, Pearson Education.

REFERENCE BOOKS:

1. Fred Halsall, Multimedia Communications: Applications, Networks, Protocols and Standards, Pearson Education.
2. John F Koegel Buford, Multimedia Systems, Pearson Education.
3. Judith Jeffcoate, Multimedia in Practice – Technology and Applications, Prentice Hall of India, 2001.
4. Pakhira,"Computer Graphics, Multimedia and Animation, 2nd ed., PHI.

HMCS18E08	**E-COMMERCE**	**3**	**0**	**0**	**3**

UNIT I Introduction To Electronic Commerce **9 0 0**

Definition – Forces Fueling Industry Framework – Types of E-Commerce- Key questions for management The internet and the access provider industry: Internet Service providers, companies providing Internet Access – Internet versus online services – predicting the future of the IAP market

UNIT II World Wide Web Applications / Concepts/Technology & Firewalls **9 0 0**

Applications : History of web – Web Hit – Web and Electronic Commerce – Web and Intra – Business customer – Intranet Architecture, Concepts & Technology: Key concepts behind the web – overview of the web's technical architecture – Interactive web applications – web and Database Integration – Web software Development tools – Multimedia web Extension Firewalls & Transaction security.

UNIT III Electronic Payment Systems / E-Commerce's Banking/ Retailing & Online Publishing **9 0 0**

Electronic Payment Systems: Overview of the Electronic payment Technology – Electronic or Digital cash – electronic checks – online credit card – based systems and others emerging financial instruments,Electronic Commerce & Banking: E-Commerce & Retailing.

UNIT IV Intranets And Supply Chain Management Customer Asset Management **9 0 0**

Supply – chain management fundamentals – managing retail supply chains – supply chain application software – future of supply – chain software, Customer Asset Management.

UNIT V Intranets And Manufacturing & Corporate Finance **9 0 0**

Intranets and manufacturing: Defining the terminology – emerging business requirements – manufacturing Information systems – Intranet- Based manufacturing –Logistics management – EDI. Corporate Finance.

Total Hours: 45

TEXT BOOK:

1. Ravi Kalakota & Andrew Winston – "Electronic Commerce – A managerial guide", Addison Wilsey 2000

REFERENCE BOOKS:

1. *David Whiteley, "Electronic Commerce: Strategy, Technologies and Applications ", McGraw Hill, 2000*
2. *K.Bajaj & D.Nag, "E-Commerce", Tata McGraw Hill Publications.*
3. *Marilyn Greenstein, Ph.D., Todd M Feinman,"Electronic Commerce "– TMH- 2000*

HMCS18E09	DIGITAL MARKETING	3	0	0	3

UNIT I INTRODUCTION 9 0 0

Digital-Marketing Past, Present & Future –Strategic Digital-Marketing and Digital -Business Models – Online Revenue Models.

UNIT II PLAN 9 0 0

Creating a Digital-Marketing Plan, Seven Steps –Situation Analysis, Strategic Planning, Relationship Management and Implementation plan.

UNIT III ENVIRONMENT 9 0 0

Overview of Digital-Marketing Environment, Global Digital -Markets, Digital divide, Building inclusive Digital markets and Social Networking,

UNIT IV MANAGEMENT 9 0 0

Creating Customer Value Online, Product Benefits and Digital Marketing Enhanced Product Development, Payment options, Pricing Strategies.

UNIT V EMERGING TRENDS 9 0 0

Emerging trends in Digital-marketing, Content Marketing, Social Media Marketing, Email Marketing, Affiliate Marketing, Video Marketing and Mobile Marketing.

Total Hours: 45

TEXT BOOK:

1. Strauss Judy, Frost Raymond (2013), E-Marketing, 7/e; New Delhi: Prentice Hall.

REFERENCE BOOKS:

1. *Chaffey Dave and Smith PR (2013), Emarketing Excellence: Planning and Optimizing your Digital Marketing; 4/e; Routledge.*
2. *Ryan Damian, (2014), Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, 3/e; Kogan Page Limited.*