ST. PHILOMENA'S COLLEGE (AUTONOMOUS), MYSORE 570015
A COLLEGE OF EXCELLENCE (UGC)
MSc. COMPUTER SCIENCE SYLLABUS
DURATION OF THE COURSE –TWO YEARS – FOUR SEMESTER
2014 - 15 ONWARDS.

Course Structure

Sl. No	Code	Subject	Type HC/SC/OE	Credit Pattern	Credits	Total Credits
FIRST SEMESTER						
1	**15MSCSAH11**	Discrete Mathematics	HC	3:1:0	4	**18+ 2 or 4**
2	**15MSCSAH12**	Data Communication and Network	HC	3:1:0	4	
3	**15MSCSAH13**	Principles of Programming and C++	HC	3:1:0	4	
4	**15MSCSAH16**	C++ Practical	HC	0:0:2	2	
5	**154MSCSAH17**	Theory of Language	HC	3:1:0	4	
	Student can **select maximum 4 credits of SC papers from odd semester options**					
SECOND SEMESTER						
1	**15MSCSBH11**	Database Management System	HC	3:1:0	4	**20**
2	**15MSCSBH12**	System Software and Operating System	HC	2:1:1	4	
3	**15MSCSBH13**	DBMS Practical	HC	0:0:2	2	
4		Open Elective	OE		4	
	Student must **select at least 6 credits of SC papers from even semester options**		SC		6	
THIRD SEMESTER						
1	**MSCSCH11**	Data Structures& Algorithms	HC	2:1:1	4	**18**
2	**MSCSCS13**	DOT Net Practical	SC	0:0:2	2	
3	**MSCSCS14**	DOT Net Technologies	SC	3:1:0	4	
4		Open Elective	OE		4	
	Student must **select at least 4 credits of SC paper from odd semester options**				4	
FOURTH SEMESTER						
1	**MSCSDH11**	Dissertation	HC	4:0:10	14	**18**
	Select at least one of the following subjects					
2	**MSCSDH12**	Network Security	HC	3:1:0	4	
3	**MSCSDH13**	Data Mining	HC	3:1:0	4	
				Total Credits		**76 / 78**

Soft Core for odd semesters (1 & 3)						
1	**MSCSS01**	Computer Architecture	SC	3:1:0	4	
2	**MSCSS02**	Image Processing	SC	3:1:0	4	
3	**MSCSS03**	Software Engineering	SC	3:1:0	4	
4	**MSCSS04**	Operation Research and Optimization	SC	3:1:0	4	
5	**MSCSS05**	Microprocessor	SC	3:1:0	4	
6	**MSCSS06**	Computer Graphics and Multimedia	SC	3:1:0	4	
7	**MSCSS10**	JAVA Programming	SC	1:0:1	2	
Soft Core for even semesters (2 & 4)						
1	**MSCSS11**	Web Engineering	SC	2:0:0	2	
2	**15MSCSBS12**	Human Computer Interaction	SC	2:1:1	4	
3	**15MSCSBS13**	Cloud Computing	SC	2:0:0	2	
4	**MSCSS14**	Fundamentals of Big Data analytics	SC	3:1:0	4	
5	**MSCSS15**	Computer Vision	SC	3:1:0	4	
Total Credits: HC=50, SC=16, OE=08						

Open Elective for other departments						
1		Information Technology and Office Automation	OE	3:1:0	4	
2		Multimedia Technology	OE	3:1:0	4	
3		Internet Fundamentals	OE	3:1:0	4	
4		Web Designing	OE	3:1:0	4	

First Semester

Title: Discrete Mathematics

Code No: MSCH1 **Hard Core Paper (3:1:0)** **Credit- 4**

UNIT I **(16 Hrs)**

Sets, Functions and Relations ,

Recapitulation, Basic concepts of Sets-Basic set operations definition and types of relations-Functions, types of functions-Examples.

Countability of sets(Countable and uncountable sets), Cardinal numbers-definition and properties-ordered sets –Venn diagram-Examples.

TextBooks: Real Analysis By SC Malik
Real Analysis By NP Bali
Discrete maths by Swapan Kumar Chakraborthy

UNIT II **(16 Hrs)**

Theory of equations

Recapitulation- Formation of equation-Relationship between roots and coefficients (2hrs)

-Roots are in AP,GP,HP **Reciprocal equations**-Standard reciprocal equation I type odd degree, II type odd degree (4hrs)

-**Transformation equations**-Formation of equations whose roots are K times the roots f(x)=0 [k!=0],Formation of the equations whose roots are diminished by 'h'

Text Book: Numerical methods-S.Armugam,A Thangapandi Isaac, A Soma Sundaram

Matrices and Determinants :

Recapitulation- Introduction to matrices and determinants (2hrs)

Rank of matrix diagonalization of a matrix. Symmetric and skew Symmetric matrix.

Hermittian matrices, Eigen values and Eigen vectors of matrix, Caley Hamilton's theorem(Statement only)- Problems Solution of Simultaneous equations using matrices- Matrix method, Gaussian Elimation method(direct method) (8hrs)

Text Book: Matrices by Shanti Narayan&P.K.Mittal

UNIT III **(16 Hrs)**

Mathematical Logic Introduction to basic Connectivity and truth tables-Logical Implications-Rules of inference-Quantifiers-Use of Quantifiers-Definition and proof of theorems

Reference Book: Discrete and Combinatorial mathematics By Ralph.P.Grimaldi and B.V.Ramana

UNIT IV **(16 Hrs)**

Graph theory

Introduction-Definition and examples-Degree-Sub graph-isomorphism-independent sets and coverings-intersections and line graphs-matrices-operation on graph-degree sequences-graphic sequences

Connectedness-Walks, trails and paths-Connectedness and Compoundness

Eulerian and Hamiltonian Graphs-trees-matching-planarity-colourability-Five colour theorem and Four colour theorem

Directed Graphs. Definition and basic properties path and connections – Tournaments

Text Books: Invitation to Graph theory by S.Armugam, S.Ramachandra
Discrete and Combitorial Discrete mathematical Structures By: Kolman, Bushee and Ross

First Semester
Title: Data Communication and Network

Code No: MSCH2 **Hard Core Paper: (3:1:0)** **Credit- 4**

UNIT I

(16Hrs)

Data Communication, Component and Basic Concepts –Introduction, (3),
Characteristics – Delivery, Accuracy, Timeliness and Jitter (4).
Components – Message, Sender, Receiver, Transmission medium and protocol (4-5).
Types of connection (Line Configuration) – Point-to-point and Multipoint (8).

Topology – Mesh, Star, Tree, Bus, Ring and Hybrid Topologies (8-13).

Transmission modes (data flow) –Simplex, Half Duplex, Full Duplex (6-7).

Categories of networks – LAN, MAN, WAN and Intranet (13-16).

Transmission Media – An Introduction (191).

Guided Media – Twisted pair cable – Unshielded and shielded twisted pair cable, Co-axial cable, Optical fiber cable – Structure and propagation (192-198).

Random access:- Pure ALOHA (365),Slotted ALOHA (369)

Unguided Media – Radio waves – Propagation (ground, sky and line-of-sight), Microwaves, Satellite Communication, Cellular Telephony (467) with their applications (203-206).

The OSI Model – Layered Architecture (30).

Functions of the Layers – Physical Layer, Data Link Layer, Network Layer, Transport Layer, Session Layer, Presentation Layer, Application Layer (33-42).

UNIT II **(16Hrs)**

Multiplexing – An Introduction (161).

Types of Multiplexing – Frequency-division multiplexing, Time-division multiplexing, Wavelength division multiplexing (162-169).

Error Detection–Types of error – Single bit error, Multiple bit error and Burst error (267-269)Detection – Redundancy (269), Checksum (298).Error correction – Single bit error correction (273), Hamming code (280).

UNIT III **(16 Hrs)**

TCP / IP – An Introduction to TCP/IP and Internet, TCP/IP and OSI, Encapsulation, TCP / IP Protocol Suite, Network Layer Internet Work Protocol (42-46).

Addressing: Physical, Logical, Port, Specific (45-50)

Other Protocols in the Network Layers – ARP, RARP, ICMP and IGMP (44).

Network Layer - Internet Protocol (579)

IPV4-Datagram, Fragmentation (582)

IPV6-Format (596)

Transport Layer – User Datagram Protocol (UDP) (709) and Transmission Control Protocol (TCP) (45 & 715-417).

Application Layer – Domain Name System (DNS) (797), Telnet (817), File Transfer Protocols (840),

UNIT IV

Concepts of Security & Classical Encryption Techniques

Introduction, The need for security, Security Approaches, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security. Symmetric Cipher Models – Substitution techniques, Transposition techniques, Steganography, Block Cipher Operation, Electronic Code Book, Cipher Block Chaining, Block Cipher Principles, The Data Encryption Standard, A DES Example, The Strength of DES, Evaluation criteria for AES, AES Cipher.

Text Books:

1. Data Communications and Networking **4th Edition** by Behrouz Forouzan.
2. William Stallings, *Cryptography and Network Security*, Prentice Hall, 5th Edition, 2010

Reference:

3. Computer Networks by Andrew S Tanenbaum. Reference Books:
4. Atul Kahate, Cryptography and Network Security, Tata McGraw-Hills, 8th Reprint, 2009, ISBN-10: 0070151458.
5. Brijendra Singh, Network Security and Management, PHI ,3rd Edition, 2013. [3] Eric Maiwald, Information Security Series, Fundamental of Network security, Dreamtech press,2010.
6. Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security: Private communication in public world, Prentice Hall, 2009.

First Semester
Title: Principles of Programming and C++

Code No: MSCH3 **Hard Core Paper: (3:1:0)** **Credit- 4**

UNIT I **(16 hrs)**

Programming Principles

Introduction: Program development life cycle, program designing tools structure charts Algorithms, flowchart, Decision table, Pseudo-codes, coding, Flow chart, symbols used in flow chart levels of flowchart , rules for drawing the flow chart, advantages and limitations of flowchart. Definition of Algorithm, Areas of algorithm study. Performance analysis- space complexity, time complexity Asymptotic notations: - big Oh - big omega - little Oh – little omega and theta notations. Decision Tables Definition, Advantages and disadvantages Pseudo-codes Definition, Advantages and disadvantages

UNIT II **(16hrs)**

1. **Introduction:** Procedure-oriented programming, Concepts of Object-oriented programming, Structure of C++ program. (04)
2. **Fundamentals:** Tokens, Keywords, Identifiers and constants, Basic Data Types, User-defined data types, Derived data Types, Symbolic constants, Type compatibility, Declaration of variables, Dynamic initialization of variables, Reference variables, Operators in C++, Scope resolution operator, Member dereferencing operators, Memory management operators, Manipulators, Type cast operator, Expressions and their types, Special assignment expressions, Implicit conversions, Operator overloading, Operator precedence, Control structures. (07)

3. **Functions:** The main function, Function prototyping, Call by Reference, Return by Reference, Inline functions, Default arguments, const arguments, Function overloading, Friend and Virtual functions. (05)

UNIT III

4. **Classes and Objects:** Specifying a Class, Defining member functions, Making an Outside function Inline, Nesting of member functions, Private member functions, Arrays within a Class, Static data members, Static member functions, Arrays of Objects, Objects as function arguments, friendly functions, Returning Objects, const member functions, Pointers to members. (06)

5. **Constructors and Destructors:** Constructors, Parameterized constructors, Multiple constructors in a class, Constructors with default arguments, Dynamic initialization of objects, Copy constructor, Dynamic constructor, Constructing Two-dimensional arrays, const Objects, Destructors. (04)

6. **Operator Overloading and Type Conversions:** Defining operator overloading, Overloading unary operators, Overloading Binary operators, Rules for overloading operators, Type conversions. (04)

7. **Inheritance :** Basic Concepts, Reusability & Extensibility, Defining derived classes, protected access specifier in Base class – public, private & protected inheritance – constructors and destructors in derived classes – Types of Inheritances, Virtual base class.

UNIT IV

1. Virtual Functions: Normal member functions accessed with pointers, virtual member function access, late binding, pure virtual function, abstract classes (03)
2. **Console I/O Operations:** C++ streams, C++ stream classes, Unformatted I/O operations, Formatted I/O operations, managing output with manipulators.
   Files: Classes for file stream operations, opening, reading, writing, closing, detecting end of file. (04)
3. **Templates :**Generic Functions- A generic swap function, Functions with more than one Generic Type, Overloading a Function Template. Generic Classes – A stack generic class, Class template with more than one Generic Type, name and template keywords, Template Restrictions, The power of Templates. (03)
4. **Exception Handling :**Fundamentals of Exception Handling, Catching Class Types, Using Multiple catch statements, Catching All Exception, Restricting Exception, throw statement, Setting the Terminate and Unexpected Handlers, Uncaught exception, Built-In Exceptions. Exception Vs Error Handling. (03)

Reference Books:

1. OOPS and C++ by Robert Lafore.
2. C++ by Stephen Prata.
3. Teach yourself c++ by Al Stevens.
4. C++ Primer by Stanley B Lippman.

First Semester
Title: C++ Practical

Code No: MSCH4 **Hard Core Paper: (0:0:2)** **Credit- 2**

C++ Practical: Based on Principles of Programming and C++ 6 Hrs per week

First Semester
Title: Theory of Languages

Code No: MSCH5 **Hard Core Paper: (3:1:0)** **Credit- 4**

UNIT I **(16hrs)**

Introduction,sets,Logic,Functions,Relations,Languages,Proofs,PMI(Principle of mathematical induction),Strong principle of mathematical induction, Recursive Definitions, Structural induction

UNIT II **(16hrs)**

Regular languages and regular expressions, Finite automata(FA),Distinguishing one string from another string , Unions, Intersections, Complements, Non Deterministic Finite automata, Non Deterministic Finite automata with A-transitions, Kleene's Theorem, criterion for Regularity, Minimal Finite automata ,Pumping lemma for regular languages

UNIT III **(16hrs)**

Introduction to CFG, regular grammars, derivation trees and ambiguity, Unambiguous CFG For algebraic expressions, Simplified forms and normal forms

UNIT IV **(16hrs)**

Introduction to push down automata(PDA),deterministic PDA ,PDA corresponding to CFG,CFG corresponding to PDA, parsing, Pumping lemma for CFG

Text books:

Introduction to Languages and Theory of computation ,3rd edition, TMH publications, John Martin

References:

1)DESIGN AND ANALYSIS OF ALGORITHMS, Pearson education, Parag Dave & Himanshu Dave.
2)Introduction to Automata Theory, Languages and Computation, Addison-Wesley,1979 by j. Hopcroft and Ullman j.

Second Semester
Title: Data Base Management System

Code No: MSCH6 **Hard Core Paper: (3:1:0)** **Credit- 4**

UNIT I:

Overview of Database Systems and Entity- Relationship Model (16hrs)

A historical perspective, file system versus a DBMS, advantage of a DBMS, levels of abstraction in a DBMS, structure of a DBMS, people who work with databases, an example of database application, entity types, entity sets, attributes and keys, relationships and relationship sets, additional features of ER-model-key constraints, participation constraints, weak entities.

UNIT II:

Relational model, Relational Algebra and Structured Query Language (16hrs)

Relational model concepts, relational constraints and relational database schemas, Basic relational algebra operations, additional relational operations, examples of queries in relational algebra. Data definition, constraints and schema changes in SQL, Basic queries in SQL, insert, delete and update statements in SQL, views in SQL.

UNIT III:

Database Design, Overview of storage and indexing (16hrs)

Informal design guidelines for relational schemas, functional dependencies, normal forms, general definitions of second and third normal forms, boyce-codd normal forms, file organization and indexing, clustered indexes primary and secondary indexes, index data structures, hash based indexing, tree-based indexing, comparison of file organizations.

UNIT IV:

Overview of transaction management (16hrs)

The ACID properties, consistency and isolation, atomicity and durability, transaction on
Schedules, concurrent execution of transactions, motivation for concurrent execution, serializability, anomalies due to interleaved execution, lock-based concurrency control, strict two phase locking, performance of locking.

Text books

1. Database management systems-Raghu Ramakrishnan and Johnees Gehrke, 3rd edition McGraw-Hill, 2003.
2. Fundamental of database systems-Elmastri and Navathe, 3rd edition, Addison Wesley, Pearson education 2000.

Reference books

1. Database system concepts- Silberschatz, Korth and Sudarshan, 4th edition, McGraw-Hill Publications
2. Database management systems- Alex Leon, Vikas Publications House
3. Database system: A practical approach to design, implementation and management- conolly 3rd edition, Pearson Education.

Second Semester
Title: System Software and Operating System

Code No: MSCH7 **Hard Core Paper: (2:1:1)** **Credit- 4**

UNIT I: **(16hrs)**

Introduction

Language Processors: Introduction, Language Processing Activities, Fundamentals of Language Processing & Language Specification, Language Processor Development Tools, Data Structures for Language Processing: Search Data structures, Allocation Data Structures, Software Tools: Software Tools for Program Development, Editors, Debug Monitors, Programming Environments and User Interfaces.

UNIT II: **(16hrs)**

Assemblers and Macro Processors

Assemblers: Elements of Assembly Language Programming, A Simple Assembly Scheme, Pass Structure of Assemblers, Design of a Two Pass Assembler, Macros and Macro Processors.

UNIT III: **(16hrs)**

Process Management and Deadlocks

Process-concept, Process scheduling and its algorithms, Operations on Processes, Inter-process Communication, multi-processor scheduling, Threads: Multi-threading models, Synchronization: Critical section problem, semaphores, Classical problems of synchronization, (Dinning Philosopher's problem, Bounded buffer problem, Reader's- Writers problem), Deadlock Characterization, deadlock detection, deadlock prevention, deadlock avoidance, Recovery from Deadlock.

UNIT IV: **(16hrs)**

Memory Management and File Systems

Need, Swapping, contiguous memory allocation, Fragmentation, Paging, Structure of Page table, Segmentation, Virtual memory management: Demand paging, Page replacement algorithms, Allocation of frames, Thrashing, Copy-on-Write, File concepts, access methods, Directory Structure, File sharing, Protection, File system structure, allocation methods, free space Management, Efficiency and performance, recovery.

Text Books:

1. Stallings W, "Operating Systems", 6th Edition, Prentice Hall India
2. Silberschatz, A., Peter B. Galvin and Greg Gagne, "Operating System Principles", Wiley-Indian Edition, 8th Edition, 2009.
3. Tanenbaum A.S., "Modern Operating Systems", 4th Edition, PHI,2001.
4. D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw-Hill, 1999.

Second Semester
Title: DBMS Practical

Code No: MSCH8 **Hard Core Paper: (0:0:2)** **Credit- 2**

DBMS Practical: Based on Database Management Theory

Third Semester
Title: Data Structures and Algorithms

Code No: MSCH9 **Hard Core Paper: (2:1:1)** **Credit- 4**

UNIT I **(16hrs)**

Introduction: concept of a data type, definition of data structure, types of data structures.

Algorithms: definition, characteristics, advantage and disadvantages, algorithmic complexity-time complexity, time complexity, expressing space and time complexity, Big Oh notation.

Sorting: definition, types of sorting techniques- bubble sort, selection sort, insertion sort, bucket sort, merge sort, quick sort, heap sort and shell sort.

UNIT II **(16hrs)**

Stacks: definition, representation of a stack in memory, operations on stack, multiple stacks, application of stacks.

Queue: definition, representation of a queue in memory, operations on queues, types of queues: linear queues, circular queues, deques, priority queues, application of queues.

Linked list: definition, representation of a linked list in memory, operations on linked list, types of linked list: linear linked list, doubly linked list, circular linked list, header linked list, application of linked list.

UNIT III **(16hrs)**

Trees: definition, tree terminology, representation of tree in memory, operations on tree, types of tree: binary tree, binary search tree, AVL tree, B-tree, B+-tree

Heaps: definition, representing a heap in memory, operations on heaps, building a heap, application of heaps.

Graphs: definition, graph terminology representation of graphs, operations on graphs, application of graphs.

UNIT IV **(16hrs)**

Hashing and hash tables: definition, hash functions, types of hash functions, rehashing.

Files: definition, basic terminologies, attributes of a file, classification of files,, operations on files, types of file organization: sequential file organization, relative file organization, indexed sequential file organization and multi-key file organizations.

Text Book:

1. "Data Structures: A Pseudocode Approach with C" by Richard Gilberg, Behrouz A. Forouzan.

References:

2. Data Structures Using C and C++, by Yedidyah Langsam, Aaron M. Tenenbaum
3. Fundamentals Of Data Structures – Ellis Horowitz & Sartaj Sahni

Third Semester

Title: DOT NET Technology

Code No: MSCS07 **Soft Core Paper: (3:1:0)** **Credit- 4**

UNIT I **(16hrs)**

C# Language Fundamentals: Introduction to the .NET framework, The Anatomy of a Basic C# Class, Creating objects: Constructor Basics, The Composition of a C# Application, Default Assignment and Variable Scope, The C# Member Initialization Syntax, Basic Input and Output with the Console Class, Understanding Value Types and References Type, The Master Node: System, Object, The System Data Types (and C# Aliases), Understanding Value Types and Reference Types, Boxing and Unboxing, Defining Program Constants, C# Iteration Constructs, C# Controls Flow Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understanding Static Methods, Methods Parameter Modifiers, The System String Data Type, Basic String Operations, Escape Characters, .NET Array Types, Arrays As Parameters (and Return Values).

UNIT II **(16hrs)**

Object-Oriented Programming with C#: Define Public Interface of a Class, Reviewing the Pillars of OOP, The First Pillars: C#'s Encapsulation Services, the Second Pillar: C#'s Inheritance Supports, keeping Family Secrets: The "Protected" Keyword, Nested Type Definitions, The Third Pillar: C#'s Polymorphic Support.

UNIT III **(16hrs)**

Exceptions and Object Lifetime: Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handling the System.Exception Base Class, Throwing a Generic Exception, Catching Exception, System-Level Exception (System.Exception), Application-Level Exception (System. Exception), Processing Multiple Exception, The Finally Block, Debugging System Exception Using VS.NET, The Basics Object Lifetime, the CIT of "new", The Basics of Garbage Collection, Finalization, The Finalization Process, Building an Ad Hoc Destruction Method, Garbage Collection Optimization, The System.GC Type.

UNIT IV **(16hrs)**

Interfaces, Collections, Callback Interfaces, **Delegates, and Events:** Defining Interfaces Using C#, Invoking Interface Members at the object Level, Understanding Explicit Interface Implementation, Building Interface Hierarchies, Implementation, Interfaces Using VS.NET, , Building Enumerator (Innumerable and Enumerator), Building Cloneable objects (Incloneable), Collections Namespace, Understanding Callback Interface, Understanding the .NET Delegate Type, defining Delegate, The Simplest Possible Delegate Example, Building aMore Elaborate Delegate Example, Understanding Delegate Covariance, Understanding C# Events

Text Books:

1. Andrew Troelsen: Pro C# with .NET 3.0, Special Edition, Dream tech Press, India,2007.
2. E. Balaguruswamy: Programming in C#, 5th Reprint, Tata McGraw Hill, 2004.
3. Herbert Schildt: C# Complete References, Tata McGraw Hill, 2004.

Reference Book:

4. Tom Archer: Inside C#, WP Publishers, 2001.
5. C# Practicals based on DOT NET Technology
6. Data structures Practical Based on Data structures and Algorithms

Third Semester
Title: DOT NET Practical

Code No: MSCS08 **Soft Core Paper: (0:0:2)** **Credit- 2**

DOT NET Practical

Fourth Semester
Title: DISSERTATION

Code No: MSCH10 **Hard Core Paper: (4:0:10)** **Credit- 14**

DISSERTATION

Fourth Semester
Title: Network Security

Code No: MSCH11 **Hard Core Paper: (3:1:0)** **Credit- 4**

UNIT 1 **(16hrs)**

Information Security: Introduction, History of Information security, What is Security, CNSS Security Model, Components of Information System, Balancing Information Security and Access, Approaches to Information Security Implementation, The Security Systems Development Life Cycle

1. Cryptography
   - 1.1 Substitution Ciphers
   - 1.2 Transposition Ciphers
   - 1.3 One Time pad
   - 1.4 Quantum Cryptography
   - 1.5 Cryptographic Principles
2. Symmetric Key Algorithms
   - 2.1 DES- Data Encryption Standards
   - 2.2 AES- Advanced Encryption Standards
   - 2.3 Rijndael
   - 2.4 Cipher Modes
     - 2.4.1 Electronic Book Mode
     - 2.4.2 Cipher Block Chaining Mode
     - 2.4.3 Cipher feedback Mode
     - 2.4.4 Stream Cipher Mode
     - 2.4.5 Counter Mode
   - 2.5 Cryptanalysis
3. Public Key Algorithms – RSA

UNIT 2 **(16hrs)**

4. Digital Signatures
   - 4.1 Symmetric Key Signatures
   - 4.2 Public Key Signatures
   - 4.3 Message Digest
   - 4.4 The Birthday Attack
5. Management Of Public Keys
   - 5.1 Certificates
   - 5.2 X-509
   - 5.3 Public Key Infrastructure
6. Communication Security
   - 6.1 IP sec
   - 6.2 Firewall
   - 6.3 VPN
   - 6.4 Wireless Security
7. Authentication Protocols

7.1 Based on – Shared Secret Key
7.2 Based on – Establishing a Shared Key
7.3 Based on – The Diffie Hell man Key
7.4 Authentication using
7.4.1 Key distribution Center
7.4.2 Kerberos
7.4.3 Public Key Cryptography

8. Email Security
   8.1 PGP – Pretty Good Privacy
   8.2 PEM – Privacy Enhanced Mail
   8.3 S/MIME
9. Web Security
   9.1 Threats
   9.2 Secure Naming
   9.3 SSL – Secure Sockets Layer
   9.4 Mobile Code Security
10. Social Issues
   10.1 Privacy
   10.2 Freedom Of Speech
   10.3 Copy Right

UNIT 3 **(16hrs)**

Security at layers(Network, Transport, Application):
IPSec, Secure Socket Layer(SSL), Transport Layer Security(TLS), Secure Electronic Transaction(SET), Pretty Good Privacy(PGP), S/MIME
Intruders, Virus and Firewalls : Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls

UNIT 4 **(16hrs)**

CYBER CRIMES Introduction
Objective
Cyber Crime – A perspective
The Problem: Current Forms of Computer Crime
Infringements of Privacy
Economic offences
Computer Hacking
Computer Espionage
Software Piracy and other forms of Product Piracy
Computer Sabotage and Computer Extortion
Computer Fraud
Illegal and harmful contents
IT ACT 2000

Text Books:

1. Computer Networks by Andrew S Tanenbaum.
2. Principles of Information Security : Michael E. Whitman, Herbert J. Mattord, CENGAGE Learning, 4th Edition
3. Cryptography and Network Security : William Stallings, Pearson Education, 4th Edition
4. Cryptography and Network Security : Forouzan Mukhopadhyay, McGraw Hill, 2nd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security : C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1stEdition.
2. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning
3. Cryptography and Network Security : AtulKahate, McGraw Hill, 2ndEdition
4. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Handbook of Security of Networks, Yang Xiao, Frank H Li, Hui Chen, World Scientific, 2011

Fourth Semester
Title: DATA MINING

Code No: MSCH12 **Hard Core Paper: (3:1:0)** **Credit- 4**

COURSE OBJECTIVES:

- To understand Data mining principles and techniques and introduce Data Mining as a cutting edge business intelligence.
- To expose the students to the concepts of Data Warehousing Architecture and Implementation.
- To study the overview of developing areas – Web mining, Text mining and ethical aspects of Data mining.
- To identify Business applications and Trends of Data mining.

UNIT I **10**

DATA WAREHOUSE

Data Warehousing - Operational Database Systems vs. Data Warehouses - Multidimensional Data Model - Schemas for Multidimensional Databases – OLAP Operations – Data Warehouse Architecture – Indexing – OLAP queries & Tools.

DATA MINING & DATA PREPROCESSING **10**

Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

UNIT II

ASSOCIATION RULE MINING **12**

Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Itemsets with and without Candidate Generation - Mining Various Kinds of Association Rules – Constraint Based Association Mining.

UNIT III

CLASSIFICATION & PREDICTION **16**

Classification vs. Prediction – Data preparation for Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

UNIT IV

CLUSTERING **16**

Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High- Dimensional Data – Constraint Based Cluster Analysis – Outlier Analysis.

COURSE OUTCOMES:

Upon Completion of the course, the students will be able to,

- Evolve Multidimensional Intelligent model from typical system.
- Discover the knowledge imbibed in the high dimensional system.
- Evaluate various mining techniques on complex data objects.

REFERENCES:

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques" Second Edition, Elsevier, Reprinted 2008.
2. K.P. Soman, Shyam Diwakar and V. Ajay, "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
4. A Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Pearson Education, 2007.

Open Elective for Odd Semesters

Title: Computer Architecture

Code No: MSCS19 **Soft Core Paper: (3:1:0)** **Credit- 4**

Objectives

To enable the students to learn the basic functions, principles and concepts of Computer Architecture, learn the fundamental aspects of Computer Architecture and design, focus on processor design, control unit design techniques and study on I/O interfacing.

Learning outcome

On successful completion of the course the students should have

- Understood Computer Architecture.
- Understood number systems, I/O, Registers and memory.
- Understood processor design, control unit design and I/O interfacing.

Unit I. Computer system (16)

Computer components – computer function – instruction fetch and execute – interrupts – I/O functions – interconnection structures – Bus interconnection – Bus structure – multiple bus hierarchies – elements of bus design.

Memory

Computer memory system overview – characteristics of memory system – memory hierarchy – cache memory principles – elements of cache design- cache size – mapping function – replacement algorithms – write policy – internal memory semiconductor memory – organization – DRAM and SRAM – types of ROM – chip logic – external memory – magnetic disk magnetic read write mechanisms – data organization and formatting – physical characteristics – disk performance parameters – RAID – optical memory.

Unit II Input/output organization. (16)

External devices – I/O modules – programmed I/O – interrupt driven I/O – DMA – I/O processor – interface circuits – serial port – parallel port – standard I/O interfaces – PCI bus, SCSI bus, USB bus.

A rithmetic – the arithmetic and logic unit – integer arithmetic – negation – addition– subtraction – multiplication and division – floating point representation – principles – IEEE standard for binary floating point representation – floating point arithmetic addition and subtraction – multiplication and division – precision considerations.

Unit III. Central processing unit (16)

Instruction sets characteristics – types of operands – types of operations – addressing modes – instruction formats - processor organization – register organization – instruction cycle – instruction pipelining- reduced instruction set architecture – RISC verses CISC

Case study: Pentium and power PC data types – operation types – addressing modes.

Unit IV. Control unit (16)

Control unit operations – micro operations – fetch cycle – indirect cycle – interrupt cycle – execute cycle – instruction cycle – control of the processor – functional requirements – control signals – hardwired implementation – control unit inputs and control unit logic – micro programmed control Basic concepts – Micro instructions – micro programmed control unit – micro instruction sequencing design considerations – sequencing techniques – address generation –micro instruction execution – micro instruction encoding.

Text Book:

[1] William Stallings, *Computer Architecture and Organization,* Pearson Education 7th Edition, 2010.

Reference Books:

[1] Carl Hamacher, Zvonko Vranesic and Safwat Zaky, *Computer Organization*, 5th Edition, Tata McGraw Hill, 2011.
[2] David A. P and John L. H, *Computer Organization and Design: The Hardware/Software Interface*, Elsevier, 2008.
[3] John P. Hayes, *Computer Architecture and Organization*, McGraw Hill, 3rd Edition, 2002.
[4] Vincent P. and Harry F. Jordan, *Computer Systems Design and Architecture*, Pearson Education, 2nd Edition, 2004.
[5] M. Morrris Mano, *Computer system architecture*, Pearson Education, 3rd Edition, 2005.

Title: IMAGE PROCESSING

Code No: MSCS09 **Soft Core Paper: (3:1:0)** **Credit- 4**

COURSE OBJECTIVES:

- To understand the basic concepts and algorithms of digital image processing.
- To familiarize the student with the image processing environments like Matlab and its equivalent open source Image processing environments.
- To expose the student to a broad range of image processing and issues and their applications, and to provide the student with practical experience using them.
- To appreciate the use of image processing in current technologies and to expose the students to real-world applications of image processing.

UNIT I FUNDAMENTALS OF IMAGE PROCESSING 16

Introduction – Elements of Visual Perception, Steps in Image Processing Systems – Digital Imaging System - Image Acquisition – Sampling and Quantization – Pixel Relationships – File Formats – Color Images and Models - Image Operations – Arithmetic, Logical, Statistical and Spatial Operations.

UNIT II IMAGE ENHANCEMENT AND RESTORATION 16

Spatial Domain - Gray Level Transformations Histogram Processing Spatial Filtering – Smoothing and Sharpening. Frequency Domain: Filtering in Frequency Domain – DFT, FFT, DCT, Smoothing and Sharpening filters – Homomorphic Filtering, Noise models, Constrained and Unconstrained Restoration Models.

UNIT III IMAGE SEGMENTATION AND IMAGE FEATURE ANALYSIS 16

Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation – Motion Segmentation, Image Features – Textures - Boundary representations and Descriptions- Component Labeling – Regional descriptors and Feature Selection Techniques.

UNIT IV MULTI RESOLUTION ANALYSIS AND MORPHOLOGICAL PROCESSING 16

Multi Resolution Analysis: Image Pyramids – Multi resolution expansion – Wavelet Transforms - Fast Wavelet Transforms - Wavelet Packets - Image Morphology - Binary and Gray Level Morphology Operations – Erosion – Dilation - Opening and Closing Operations – Distance Transforms – Basic Morphological Operations.

COURSE OUTCOMES:

Upon Completion of the course, the students should be able to

- Implement basic image processing algorithms using MATLAB tools.
- Design an application that incorporates different concepts of Image Processing.
- Apply and explore new techniques in the areas of image enhancement- restoration- segmentation- compression-wavelet processing and image morphology.

- Critically analyze different approaches to implement mini projects
- Explore the possibility of applying Image processing concepts in various domains

REFERENCES:

1. S.Sridhar, "Digital Image Processing", Oxford University Press, 2011, New Delhi.
2. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing", Third Edition, Pearson Education, 2008, New Delhi.
3. Alasdair McAndrew, "Introduction to Digital Image Processing with Matlab", Cengage Learning 2011, India.
4. Anil J Jain, "Fundamentals of Digital Image Processing", PHI, 2011.
5. Wilhelm Burger, Mark J Berge, "Digital Image Processing: An algorithmic Introduction using Java", Springer International Edition, 2008.

Title: Software Engineering

Code No: MSCS03 **Soft Core Paper: (3:1:0)** **Credit- 4**

UNIT I **(16 Hrs)**

1. **Overview:** (16hrs)
   a. **Ch 1:** Introduction, FAQs about software engineering (5-13),
   b. **Ch 2:** System modeling(26-28), The system engineering process (29-36), System Procurement (37-38);
   c. **Ch 3:** Software process models (43-50), Software specification (55-56), Software design and implementation 56-58), Software validation (60-62), Software evolution (63).

UNIT II **(16 Hrs)**

2 **Requirement Engineering:**(98) (08hrs)
   a. **Ch 5:** Functional and Non-functional requirements (100-106), User requirements (106-109), System requirements (109-115), the software requirements document(115-118);
   b. **Ch 6:** Feasibility studies (123), Requirements elicitation and analysis (124-131), Requirements validation (137-129), Requirements management (139-144).

2. **System Models:** (08hrs)
   a. **Ch 7:** Context models (150-152), Behavioral models (153-154), Data models (158), Object models(160-161);
   b. **Ch 8:** Prototyping in software process (174-178), User interface prototyping (188-189)

UNIT III **(16 Hrs)**

3. **Software Design:** (16 Hrs)
   a. **Ch 10:** Architectural design (216-218) - System structuring (219-224), Control models (224-227), Modular decomposition (229-230);
   b. **Ch 12:** Object Oriented design (261) – Objects and object classes (262-264), An object oriented design process (267-268);
   c. **Ch 15:** User interface design– Principles, User interaction, Information presentation, User support. (328-345)

UNIT IV **(16 Hrs)**

4. **Verification and Validation:** (08hrs)
   a. **Ch 19:** Verification and Validation Planning, Software inspections, Automated static analysis, Clean room software development; (419-435)
5. **Software Management:** (08hrs)
   a. **Ch 04:** Project management – Activities, Planning, Scheduling, Risk management;(72-90)

Text Books:

1. Software Engineering, Ian Sommerville, **6th Edition**, Pearson Education Ltd., 2001.

Reference Books:

2. Software Engineering A practitioners approach, Roger. S. Pressman, Tata-McGraw Hill 4th Edition.
   1. An Integrated Approach to Software Engineering, PankajJalote, Narosa Publications.

Title: Operations Research and Optimization

Code No: MSCS15 **Soft Core Paper: (3:1:0)** **Credit- 4**

UNIT I **(16)**

Introduction to Operations Research: Basics definition, scope, objectives, phases, advantages and limitations of Operations Research. Linear Programming Problem – Formulation of LPP, Graphical solution of LPP. Simplex Method, Artificial variables, big-M method, degeneracy and unbound solutions.

UNIT II **(16)**

Assignment model: Formulation. Hungarian method for optimal solution.

UNIT III **(16)**

Sequencing models: Introduction, taxonomy of sequencing models, Processing m jobs through two machines, processing 2 jobs through m machines, Traveling salesman problem.

Game theory: Introduction, Basic terminology, Algebraic method, Calculus method, Advantages and limitations of game theory.

UNIT IV **(16)**

Network analysis: Construction of network, Rules and precautions for drawing the network diagram, Application of CPM and PERT, obtaining of critical path, time estimates for activities, Crashing of simple networks. **(16hrs)**

Recommended books :

1. Operations Research – An introduction 6th Edition , Taha H.A., Hall of India
2. Operations Research Techniques for Management 7th Edition, Kapoor V.K., Sultan Chand & Sons
3. Operations Research 9th Edition, Kantiswarup, Gupta P.K. & Sultan Chand & Sons Manmohan
4. Operations Research 8th Edition, Sharma S.D., Kedarnath, Ramnath& Company
5. Operations Research 2nd Edition, Bronson R, Shaum's Outline Series J K Sharma- Operations Research (Pearson)

Title: MICROPROCESSORS

Code No: MSCS20 **Soft Core Paper: (3:1:0)** **Credit- 4**

UNIT I: **(16)**

THE 8085 PROCESSOR : Introduction to microprocessor, 8085 microprocessor : Architecture, instruction set, interrupt structure, and Assembly language programming.

UNIT II: **(16)**

THE 8086 MICROPROCESSOR ARCHITECTURE : Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals

UNIT III: **(16)**

INSTRUCTION SET OF 8086 : Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples.

UNIT IV: **(16)**

INTERFACING DEVICE : 8255 Programmable peripheral interface, interfacing keyboard and seven segment display, 8254 (8253) programmable interval timer, 8259A programmable interrupt controller, Direct Memory Access and 8237 DMA controller.

TEXT BOOKS :

1. Microprocessor Architecture, Programming & Applications with 8085 : Ramesh S Gaonkar; Wiley Eastern Ltd.
2. The Intel Microprocessors 8086- Pentium processor : Brey; PHI

REFERENCE BOOKS:

1. Microprocessors and interfacing : Hall; TMH
2. The 8088 & 8086 Microprocessors-Programming, interfacing,Hardware & Applications :Triebel & Singh; PHI
3. Microcomputer systems: the 8086/8088 Family: architecture, Programming & Design : Yu-Chang Liu & Glenn A Gibson; PHI.
4. Advanced Microprocessors and Interfacing : Badri Ram; TMH.

Title: Computer Graphics and Multimedia

Code No: MSCS21 **Soft Core Paper: (3:1:0)** **Credit- 4**

UNIT I: **(16)**

Introduction and overview of graphic systems

Video display devices, Refresh cathode ray tubes, raster scan and random scan displays, graphics monitors and workstations, input device, hard-copy devices, graphics software and functions.
Output primitives and attributes:- Points and lines, line drawing algorithms, Loading the frame buffer, line function, circle generating algorithms, filled area primitives, fill area functions, area fill attributes, character attributes, Antialiasing.

UNIT II: **(16)**

Two dimensional geometric transformation and viewing

Basic transformation, matrix representation and Homogeneous co-ordinates, Transformation between co-ordinate systems, transformation functions.
Window-to-viewport coordinate transformation, Two dimensional viewing functions, clipping operations, point clipping, line clipping, polygon clipping, text clipping.

UNIT III: **(16)**

Three dimensional concepts, Object representations, Modeling transformations and viewing.

Three dimensional display methods, Three dimensional graphics packages, three dimensional display methods, polygon surfaces, curved lines and surfaces quadric surface, Bezier curves and surfaces, B-spline curves and surfaces.
Transformation: translations, rotation, scaling, other transformations, composite transformations,three dimensional transformation functions.
3D Viewing: viewing pipiline, viewing co-ordinates.

UNIT IV: **(16)**

Visible surface detection methods and Color Application.

Classification of visible surface detection algorithms, Back-Face detection, depth buffer methods, RGB color model.

Text Books:

Computer Graphics-C Version- Donald Hearn and M Pauline Baker
Pearson Education, Second Edition-2003.

References:

1. Computer Graphics: Principles and Practice- Foley etal Addison-Wesley professional 2^{nd} edition.
2. Principles of Interactive Computer Graphics- Newman &Sproull McGraw-Hill, Inc, New York NY, USA.

Java Programming

Code No: MSCS14 **Soft Core Paper: (1:0:1)** **Credit- 2**

Course objectives: This course introduces fundamental structured and object-oriented programming concepts and techniques, using Java, and is intended for all who plan to use computer programming in their studies and careers. topics covered include variables, arithmetic operators, control structures, arrays, functions, recursion, dynamic memory allocation, files, class usage and class writing.

Unit 1:

1- **Introduction**
   Chapter 3 : Variables, arithmetic operators, constants, strings, statements, input and output.
2- **Decisions & Types**
   Chapter 4 : Decision statements (if, if/else, switch), relational operators, boolean expressions, comparing Strings.
3- **Loops & File I/O**
   Chapter 4 : Repetition statements (while, do/while, for), nesting.
   Chapter 16 (15): Input and output text files.
4- **Writing Static Methods & Javadocs**
   Chapter 5 : Math & Character classes, String & Random classes. Writing static methods.
   Interlude (between chapters 5 and 6) : Writing helper classes w/static methods.

Unit 1:

5- **Writing Classes & Non-Static Methods**
   Chapter 6 (7): Writing instantiable classes, accessors & mutators.
   Chapter 8 (9): Class (static) variables & methods.
6- **Primitive Arrays**
   Chapter 9 (10): One dimensional arrays of primitives, two dimensional arrays, arrays of objects.
7- **Classes with Arrays**
   Chapter 9 (10): Classes with arrays, common array operations.
8- **Exceptions**
   Chapter 15 (14): Exception handling.

Course Outcomes: On successful completion if this course, students should be able to:

- Understand the basic concepts and principles of structured programming.
- Understand the basic concepts and principles of object oriented programming.
- Produce sample use-cases, pseudocode, and an incremental coding plan for a given problem specification.
- Design, write, and test a Java program to implement a solution to a given problem specification.
  Understand the operation of common data structures and algorithms.

Textbook:

1- Introduction to Programming with Java: A Problem Solving Approach, Second Edition, John Dean & Raymond Dean, McGraw-Hill Higher Education, January 2013 ISBN-10: 007337606X ISBN-13: 978-0073376066

References:

2- D. Flanagan, Java Examples in a Nutshell, O'Reily.
3- Deitel & Deitel, Java How to Program, Prentice Hall.
4- Arnold, Gosling & Holmes, The Java Programming Language, Addison-Wesley Professional.

Open Elective for Even Semesters

Title: WEB ENGINEERING

Code No: MSCS22 **Soft Core Paper: (2:0:0)** **Credit- 2**

Course objective

Objectives: To understand the concepts, principles, strategies, and methodologies of Web applications and development. to apply current Web technologies to understand current Web business models, to understand and apply Web development processes.

Learning outcome

Upon successful completion of the course the student will:
- Be able to understand the concepts, principles and methods of Web engineering.
- Be able to apply the concepts, principles, and methods of Web engineering to Web applications development.
- Be familiar with current Web technologies.

UNIT I.
(16)

An Introduction to Web Engineering: Motivation, Categories of Web Applications, Characteristics of Web Applications, Product-related Characteristics, Usage related Characteristics, Development-related Characteristic, Evolution of web engineering.

Requirements Engineering for Web Applications
Introduction, Fundamentals, Where Do Requirements Come From? Requirements Engineering Activities RE Specifics in Web Engineering, Principles for RE of Web Applications, Adapting RE Methods to Web Application Development, Requirement Types, Notations, Tools.

UNIT II.
(16)

Information Architecture: The role of the Information Architect, Collaboration and Communication, Organizing Information, Organizational Challenges, Organizing Web sites and Intranets, Creating Cohesive Organization Systems Designing Navigation Systems, Types of Navigation systems, Integrated Navigation Elements, Remote Navigation Elements, Designing Elegant Navigation Systems, Searching Systems, Searching your Web Site, Designing the Search Interface, Indexing the Right Stuff, To search or Not To Search, Grouping Content, Conceptual Design, High-Level Architecture Blueprints, Architectural Page Mockups, Design Sketches.

Web Project Management:

Understanding Scope, Refining Framework Activities, Building a WebE Team, Managing Risk, Developing a Schedule, Managing Quality, Managing Change, Tracking the Project.

TEXT BOOKS

1. Gerti Kappel, Birgit Proll, "Web Engineering", John Wiley and Sons Ltd, 2006
2. Roger S.Pressman, David Lowe, "Web Engineering", Tata McGraw Hill Publication, 2007
3. Guy W. Lecky-Thompson, "Web Programming", Cengage Learning, 2008

REFERENCES

4. Moller, "An Introduction to XML and Web Technologies" , Pearson Education New Delhi, 2009
5. Chris Bates, "Web Programming: Building Internet Applications", Third Edition, Wiley India Edition, 2007
6. John Paul Mueller, "Web Development with Microsoft Visual Studio 2005", Wiley Dreamtech, 2006
7. CGI Programming with Perl 2/e, Scott Guelich, Shishir Gundavaram, Gunther Birzniek; O'Reilly
8. Doug Tidwell, James Snell, Pavel Kulchenko; Programming Web Services with SOAP, O' Reilly
9. Pardi, XML in Action, Web Technology, PHI

Title: HUMAN COMPUTER INTERACTION

Code No: MSCS23 **Soft Core Paper: (2:1:1)** **Credit- 4**

COURSE OBJECTIVES:

- To learn the principles and fundamentals of human computer interaction (HCI).
- To analyze HCI theories, as they relate to collaborative or social software.
- To establish target users, functional requirements, and interface requirements for a given computer application.
- To understand user interface design principles, and apply them to designing an interface.
- To learn user interface designs through usability inspection and user models.
- To know the applications of multimedia on HCI.

UNIT I DESIGN PROCESS **1 6**

Humans – Information Process – Computer – Information Process – Differences and Similarities – Need for Interaction – Models – Ergonomics – Style – Context – Paradigms – Designing of Interactive Systems – Usability – Paradigm shift – Interaction Design Basics – Design Process – Scenarios – Users Need –Complexity of Design

UNIT II DESIGN AND EVALUATION OF INTERACTIVE SYSTEMS **16**

Software Process – Usability Engineering – Issue based Information Systems – Iterative Design Practices – Design Rules – Maximum Usability – Principles – Standards and Guidelines – Design Patterns – Programming Tools – Windowing Systems – Interaction Tool Kit – User Interface Management System – Evaluation Techniques – Evaluation Design – Evaluating Implementations – Observational Methods.

UNIT III MODELS **16**

Universal Design Principles – Multimodal Systems – User Support – Presentation and Implementation Issues – Types – Requirements – Approaches – Cognitive Model – Hierarchical Model – Linguistic Model – Physical and Device Models – Socio technical Models – Communication and Collaboration Models – Task Models – Task Analysis And Design.

UNIT IV EXPERIMENTAL DESIGN AND STATISTICAL ANALYSIS OF HCI **16**

Basic Design Structure – Single Independent Variable – Multiple Independent Variable – Factorial Design – Split-Plot Design – Random Errors – Experimental Procedure – Statistical Analysis – T Tests – Analysis of Variance Test – Regression – Chi-Square Test – Survey – Probabilistic Sampling – Non-Probabilistic Sampling – Developing Survey Questions.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to Interpret the contributions of human factors and technical constraints on human-computer interaction.

- Evaluate the role of current HCI theories in the design of software.
- Apply HCI techniques and methods to the design of software.
- Categorize and carefully differentiate various aspects of multimedia interfaces.
- Design and develop issues related to HCI for real application.

References:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", Third Edition, Prentice Hall, 2004.
2. Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, "Research Methods in Human-Computer Interaction", Wiley, 2010.
3. Ben Shneiderman and Catherine Plaisant, "Designing the User Interface: Strategies for Effective Human-Computer Interaction", Fifth Edition, Addison-Wesley Publishing Co, 2009.

Title: Cloud Computing

Code No: MSCS24 **Soft Core Paper: (2:0:0)** **Credit- 2**

UNIT - I **(16)**

Cloud Computing – Overview – Applications-Intranets and the Cloud – Companies in the Cloud Today- Cloud Computing Services- On Demand Computing – Discovering Cloud Services- Development Services and Tools.
Cloud software architecture issues- Classification of Cloud Implementations.

UNIT - II **(16)**

Cloud hardware and infrastructure-clients-security-network-services-platforms-cloud storage. Operating System for the Cloud - Application Patterns and Architecture – Case Studies-Cloud Computing services available under various platforms.

References:

1. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, "Cloud Computing –A Practical Approach", Tata McGraw Hill Education Pvt. Ltd, 2010.
2. Michael Miller," Cloud Computing: Web based Applications that change the way you work and Collaborate online", Que Publishing, August 2008.
3. Haley Beard, "Cloud Computing Best Practices for Managing and Measuring Processes for on demand computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pvt. Ltd, July 2008.
4. Prof (Dr.) Andreas Polze, "A Comparative Analysis of Cloud Computing Environments".

Title: FUNDAMENTALS OF BIG DATA ANALYTICS

Code No: MSCS25 Soft Core Paper: (3:1:0) Credit- 4

COURSE OBJECTIVES:

- To know the fundamental concepts of big data and analytics.
- To learn various techniques for mining data streams.
- To learn Event Modeling for different applications.

UNIT I INTRODUCTION TO BIG DATA 16

Introduction to Big Data Platform – Challenges of Conventional Systems - Web Data – Evolution Of Analytic Scalability - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

UNIT II DATA ANALYSIS 16

Regression Modeling - Multivariate Analysis - Bayesian Modeling - Inference and Bayesian Networks - Support Vector and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics - Rule Induction - Neural Networks: Learning And Generalization - Competitive Learning - Principal Component Analysis and Neural Networks - Fuzzy Logic: Extracting Fuzzy Models from Data - Fuzzy Decision Trees - Stochastic Search Methods.

UNIT III MINING DATA STREAMS and FREQUENT ITEMSETS 16

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

Mining Frequent Itemsets - Market Based Model – Apriori Algorithm – Handling Large Data Sets in Main Memory – Limited Pass Algorithm – Counting Frequent Itemsets in a Stream.

UNIT IV CLUSTERING, FRAMEWORKS AND VISUALIZATION 16

Clustering Techniques – Hierarchical – K-Means – Clustering High Dimensional Data – CLIQUE And PROCLUS – Frequent Pattern based Clustering Methods – Clustering in Non-Euclidean Space – Clustering for Streams and Parallelism.

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed File Systems – Visualizations - Visual Data Analysis Techniques - Interaction Techniques; Systems and Applications.

COURSE OUTCOMES:

Upon Completion of the course, the students should be able to,

- Work with big data platform and its analysis techniques.
- Design efficient algorithms for mining the data from large volumes.
- Model a framework for Human Activity Recognition.

REFERENCES:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
4. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007
5. Pete Warden, "Big Data Glossary", O'Reilly, 2011.
6. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008**.**

Title: COMPUTER VISION

Code No: MSC26 **Soft Core Paper: (3:1:0)** **Credit- 4**

Objective:

To introduce the student to computer vision algorithms, methods and concepts which will enable the student to implement computer vision systems with emphasis on applications and problem solving

Unit I **16**

1. Recognition Methodology: Conditioning, Labeling, Grouping, Extracting, Matching. Edge detection, Gradient based operators, Morphological operators, Spatial operators for edge detection. Thinning, Region growing, region shrinking, Labeling of connected components.
2. Binary Machine Vision: Thresholding, Segmentation, Connected component labeling, Hierarchal segmentation, Spatial clustering, Split & merge, Rule-based Segmentation, Motion-based segmentation.

Unit II **16**

3. Area Extraction: Concepts, Data-structures, Edge, Line-Linking, Hough transform, Line fitting, Curve fitting (Least-square fitting).
4. Region Analysis: Region properties, External points, Spatial moments, Mixed spatial gray-level moments, Boundary analysis: Signature properties, Shape numbers.

Unit III **16**

5. Facet Model Recognition: Labeling lines, Understanding line drawings, Classification of shapes by labeling of edges, Recognition of shapes, Consisting labeling problem, Back-tracking, Perspective Projective geometry, Inverse perspective Projection, Photogrammetry ñ from 2D to 3D, Image matching : Intensity matching of ID signals, Matching of 2D image, Hierarchical image matching.
6. Object Models And Matching: 2D representation, Global vs. Local features.

Unit IV **16**

7. General Frame Works For Matching: Distance relational approach, Ordered structural matching, View class matching, Models database organization.
8. General Frame Works: Distance ñrelational approach, Ordered ñStructural matching, View class matching, Models database organization.
9. Knowledge Based Vision: Knowledge representation, Control-strategies, Information integration.

Text Books:

1. David A. Forsyth, Jean Ponce, ìComputer Vision: A Modern Approachî
2. R. Jain, R. Kasturi, and B. G. Schunk, ìMachine Visionî, McGraw-Hill.

References:

1. Milan Sonka,Vaclav Hlavac, Roger Boyle, ìImage Processing, Analysis, and Machine Visionî Thomson Learning
2. Robert Haralick and Linda Shapiro, ìComputer and Robot Visionî, Vol I, II, AddisonWesley, 1993.

Proposed List of Hard Core, Soft Core and Elective course for M.Sc. in Computer Science

Hard Core Subjects

1.	MSCH01	Discrete Mathematics	3:1:0
2.	MSCH02	Data communication and Networks	3:1:0
3.	MSCH03	Principles of Programming and C++	3:1:0
4.	MSCH04	C++ Practical	0:0:2
5.	MSCH05	Theory of Languages	3:1:0
6.	MSCH06	Data Base Management System	3:1:0
7.	MSCH07	System Software and Operating System	2:1:1
8.	MSCH08	DBMS Practical	0:0:2
9.	MSCH09	Data structures & Algorithmic	2:1:1
10.	MSCH10	Dissertation	4:0:10
11.	MSCH11	Network Security	3:1:0
12.	MSCH12	Data Mining	3:1:0

Soft Core Subjects

1.	MSCS01	Complier Construction	2:1:1
2.	MSCS02	Graph Theoretic Algorithms	2:1:1
3.	MSCS03	Software Engineering	3:1:0
4.	MSCS04	Software Testing and Quality Assurance	2:1:1
5.	MSCS05	Multi-Data Analysis	2:1:1
6.	MSCS06	Research Methodology & Documentation	3:1:0
7.	MSCS07	.Net Technology	3:1:0
8.	MSCS08	.Net Practical	0:0:1
9.	MSCS09	Image processing	3:1:0
10.	MSCS10	Information Retrieval	2:1:1
11.	MSCS11	Pattern Recognition	3:0:1
12.	MSCS12	Probability and Statistics	3:1:0
13.	MSCS13	Artificial Intelligence	3:1:0
14.	MSCS14	JAVA Programming	1:0:1
15.	MSCS15	Operations Research and Optimization	3:1:0
16.	MSCS16	Simulation And Modeling	3:1:0
17.	MSCS17	Numerical Algorithms	2:0:2
18.	MSCS18	Mobile Communication	3:1:0
19.	MSCS19	Computer Architecture	3:1:0
20.	MSCS20	Microprocessor	3:1:0
21.	MSCS21	Computer Graphics and Multimedia	3:1:0

22. MSCS22	Web Engineering	3:1:0
23. MSCS23	Human Computer Interaction	3:1:0
24. MSCS24	Cloud Computing	3:1:0
25. MSCS25	Fundamentals of Big Data analytics	3:1:0
26. MSCS26	Computer Vision	3:1:0
27. MSCS27	Fussy Theory	3:0:1

Elective Subjects

1. MSCE01	Communication skills and professional Management	3:1:0
2. MSCE02	Cryptography	3:1:0
3. MSCE03	Data Analysis	3:0:1
4. MSCE04	Data Compression	3:0:1
5. MSCE06	Data Indexing	2:1:1
6. MSCE07	Advanced Probability & Statistics	3:1:0
7. MSCE08	Embedded Systems	2:1:1
8. MSCE09	Advanced Data Structures	2:1:1
9. MSCE10	Hardware & Networking	2:1:1
10. MSCE12	Matrix Programming	1:1:2
11. MSCE13	Medical Imaging	3:0:1
12. MSCE15	Multimedia Communication	3:0:1
13. MSCE16	Network Security	2:1:1
14. MSCE17	Practicing Software Designs	1:1:2
15. MSCE18	Simulation and Modeling	2:1:1
16. MSCE19	Software Engineering Case Tools	1:1:2
17. MSCE20	Software quality testing	2:1:1
18. MSCE21	Semantic Web	2:1:1
19. MSCE22	System Analysis and Design	3:1:0
20. MSCE23	Theory of Complexity	3:1:0
21. MSCE24	Process Automation	2:1:1
22. MSCE25	Parallel Computing Algorithms	2:1:1
23. MSCE26	Data Clustering	2:1:1
24. MSCE27	Advanced Numerical Algorithm	2:1:1
25. MSCE28	Fundamentals of Control Systems	3:1:0
26. MSCE29	Computer Forensics	2:1:1
27. MSCE30	Biometrics	2:0:2

Open Elective (OE) that can be introduced to other departments.

Information Technology and Office Automation

Code No: MSCSOE16 **Open Elective Paper: (3:1:0)**
Credit- 4

Unit I Introduction **(16)**

Software and Hardware.

Computer Hardware:

Block Diagram of elements of digital computer-their functions.
Memory, CPU, I-O devices, Secondary storages, Magnetic Tape, Disk, CD-ROM.
Other recent developments-Scanners, Digitizer, Plotters.

Basic Concept of Networking and Data Communications:

Introduction to LAN and basic communication concepts

Unit II Computer Software **(16)**

Operating System (Windows) and different applications (MS Paint, Notepad).

Unit III Office applications **(16)**

Word,

Excel and

Power Point

Unit IV Internet & Virus **(16)**

Introduction to Internet,

E-Mail.

Books.

Computers Today 3e: by Sanders.
Computers: by Trainor & Krasnewich (McGraw Hill).
Fundamentals of Computers: by Rajaraman.
Know your PC: by Peter Norton.
Computer Studies : by C.S.French.
Elements of digital computer: by Thomas Bartee.

Multimedia Technology

Code No: MSCSOE17 **Open Elective Paper: (3:1:0)**

Credit- 4

UNIT-I **16**

Introduction: What is multimedia? Defining the scope of multimedia. Applications of multimedia, hardware and software requirements, Digital representation: Introduction, Analog representation, waves, digital representation, need for digital representation, A to D conversion, D to A conversion, relation between sampling rate and bit depth, Quantization error, Fourier representation, pulse modulation. Importance and drawback of digital representation.

UNIT -II **16**

Text and Image: Introduction, Types of text, Font, insertion, compression, File formats. Types of images, color models, Basic steps for image processing, principle and working of scanner and digital camera, Gamma and gamma correction.

UNIT -III **16**

Audio and Video technology: Fundamental characteristics of sound, psychoacoustics, Raster scanning principles, sensors for TV cameras, color fundamentals, additive and subtractive color mixing, Liquid crystal display (LCD), Plasma Display Panel (PDP), file formats.

UNIT -IV **16**

Compression and coding: What is compression? Need for compression, Types of compression-basic compression techniques-run length, Huffman's coding, JPEG, zip coding. Overview of Image and Video compression techniques.

Text Book:

1. Principles of Multimedia by Ranjan Parekh. Tata McGraw-Hill

Reference:

1. Multimedia Systems Design by Prabhat K. Andleigh and Kiran Thakrar-PHI publication
2. Multimedia systems by John F. Koegal Buford-Pearson Education.
3. Fundamentals of multimedia by Ze-Nian Li and MS Drew. PHI EEE edition.

INTERNET FUNDAMENTALS

Code No: MSCSOE18 **Open Elective Paper: (3:1:0)**

Credit- 4

UNIT I Internet: **16**

Introduction to networks and internet, history, working of Internet, Internet Congestion, internet culture, business culture on internet. Collaborative computing & the internet. Modes of Connecting to Internet, Internet Service Providers(ISPs), Internet address, standard address, domain name, DNS, IP.v6.Modems and time continuum, communications software; internet tools.

UNIT II World Wide Web: **16**

Introduction, Miscellaneous Web Browser details, searching the www: Directories search engines and Meta search engines, search fundamentals, search strategies, working of the search engines, Telnet and FTP.

Introduction to Browser, Coast-to-coast surfing, hypertext markup language, Web page installation, Web page setup, Basics of HTML & formatting and hyperlink creation.

Using FrontPage Express, Plug-ins.

UNIT III Languages: **16**

Basic and advanced HTML, java script language, Client and Server Side Programming in java script. Forms and data in java script, XML basics.

Introduction to Web Servers: PWS, IIS, Apache; Microsoft Personal Web Server. Accessing & using these servers.

UNIT IV Electronic Mail, Privacy and security topics: **16**

Introduction, advantages and disadvantages, User ids, Pass words, e-mail addresses, message components, message composition, mailer features, E-mail inner workings, E-mail management, Mime types, Newsgroups, mailing lists, chat rooms.

Introduction, Software Complexity, Encryption schemes, Secure Web document, Digital Signatures, Firewalls.

Text Book:

- Fundamentals of the Internet and the World Wide Web, Raymond Greenlaw and Ellen Hepp – 2001, TMH
- Internet & World Wide Programming, Deitel,Deitel & Nieto, 2000, Pearson Education.

Reference Books:

- Complete idiots guide to java script,. Aron Weiss, QUE, 1997
- Network firewalls, Kironjeet syan-New Rider Pub.
- www.secinf.com
- www.hackers.com

- Alfred Glkossbrenner-Internet 101 Computing MGH, 1996

Internet lab Exercises involving:

- Sending and receiving mails.
- Chatting on the net.
- Using FTP and Tel net server.
- Using HTML Tags (table, form, image, anchor etc.).
- Making a Web page of your college using HTML tags

WEB DESIGNING

Code No: MSCSOE15 **Open Elective Paper: (3:1:0)** **Credit- 4**

UNIT-1 16 Hrs

Fundamentals of Web Designing: Computer network, types of Computer network: LAN, MAN and WAN. MODEM, NIC, Internet, World Wide Web, URL, IP address, establishing connectivity on the Internet, Protocols: TCP, FTP, HTTP, communicating on the Internet, web browsers, web servers. Search engines, firewalls.

UNIT-2 16 Hrs

Hyper Text Markup Language (HTML): Definition, uses of HTML, HTML tags, paired tags, singular tags, the structure of an HTML program, title and footer, text formatting text effects, text styles. Lists: unordered list, ordered list, and nested lists. Adding graphics to HTML documents, tables: width, border, cell padding, cell spacing, colspan, rowspan attributes, linking documents to HTML document, frames.

UNIT-3 16 Hrs

JavaScript: Definition, uses of JavaScript, basic programming techniques: data types and literals, creating variables, operators, expression, Built-in functions, JavaScript programming constructs: IF, WHILE and FOR. Dialog boxes, script tag. JavaScript document object model: properties, methods and events of an object, browser objects, Form Elements: Text, Password, Button, Checkbox, Radio Button, Reset, Submit And Select. String Object, Math Object And Date Object.

Reference Books:

1. Ivan Bayross, HTML, Javascript, DHTML and PHP, BPB Publications, 4 th Edition
2. M. Srinivasan, Web Technology Theory and Practice, Dorling Kindersley, 2012