Syllabus of M.Sc. in Information Science

Institute of Engineering & Management

Duration: Two-years with four semesters.

Intake: 20 students per year.

Admission: Through common entrance test, followed by GD & P.I.

Eligibility: First class/divn. in Madhyamic, Higher Secondary, B.Sc. (Physics/Maths./Stats/Computer Sc./Electronics Sc.) / BCA or equivalent with strong mathematical background.

Structured Syllabus

SEMESTER – I

MI101) Mathematics for Information Science   (3 credits)
MI102) Data Structure with C/C++   (3   "   )
MI103) Computer Organisation   (3   "   )
MI104) Data Base Management System (DBMS)   (3   "   )
MI105) Business Communication   (3   "   )

Practical

MI191) Programming & Data Structure with C & C++   (4 credits)
MI192) DBMS Lab   (3   "   )

Sessional

MI193) Personality Development   (2 credits)

SEMESTER – II

MI201) Library & Information Sc.   (3 credits)
MI202) Object Technology   (3   "   )
MI203) Operating System & System Programming (3   "   )
MI204) Software Engineering   (3   "   )
MI205) Information Theory   (3   "   )

Practical

MI291) OOPS Lab with Java   (3 credits)
MI292) Operating System (OS) Lab   (3   "   )
MI293) System Software & Administration Lab   (3   "   )

SEMESTER – III

MI301) Computer Networking	(3 credits)
MI302) Computer Graphics & Multimedia	(3 ")
MI303) Data Communication Principles	(3 ")
MI304) Information Law & Policy	(3 ")
MI305) Web Technology &Advanced Java	(3 ")

Practical

MI391) Multimedia & Graphics Lab	(3 credits)
MI392) Networking Lab	(3 ")
MI393) Web technology Lab	(3 ")

SEMESTER – IV

MI401) Soft Computing	(3 credits)
MI402) Digital Image Processing	(3 ")
MI403) Values & Ethics in Profession	(3 ")
MI404) E-Commerce	(3 ")
MI405) Elective (one elective will be offered)	(3 ")

MI481)Project	-	(3 credits)
MI482)Seminar		(3 ")
MI483)Grand Viva	-	(3 ")

List of Elective Papers(MI405)

a) Wireless & Mobile Computing
b) Artificial Intelligence (AI)
c) Image Processing & Pattern Recognition (PR)

Detailed Syllabus
SEMESTER – I

MI101) Mathematics for Information Science:

Sets and functions: Groups, Semigroups and monoids, Cyclic semigroups and submonoids, Subgroups and Cosets, Congruence relations on Semigroups. Morphisms, Normal subgroups. Structure of cyclic groups, permutation groups, dihedral groups. Elementary applications in coding theory.

Rings and Boolean algebra: Rings, Subrings, morphism of rings, ideals and quotient rings. Euclidean domains. Integral domains and fields. Boolean Algebra - direct product, Morphisms. Boolean sub-algebra. Boolean Rings. Applications of Boolean algebra in logic circuits and switching functions.
Recursion and Recurrence Relation: Basic idea, Sequence and discrete function. **Generating functions and applications**. **Propositional Logic and Predicate Calculus.**

Graph Thoery: Graphs, Digraphs, Isomorphism, Walks, Paths, Circuits, Shortest Path Problem, Dijkstra's Algorithm, Trees, Properties of Trees, Cotrees and Fundamental Circuits, Shortest Spanning Trees - Kruskal's Algorithm,Prim's Algorithm,DFS,BFS, Cut Sets, Fundamental Cut Sets and Cut Vertices, Planar and Dual Graphs, Metric Representation of Graphs, Networks, Flow Augmenting Path, Ford-Fulkerson Algorithm for Maximum Flow.

Text:
1. Liu C. L., "Introduction to combinatorial mathematics", McGraw Hill, 1968.
2. Mott J. L., Kandel A. and Baker T. P., "Discrete mathematics for Computer Scientists and Mathematicians", PH, 1986.
3. Rosen—Discrete Mathematics, 2/e,TMH
4. S.K. Mapa—Higher Algebra (Abstract & Modern)
5. Robert J. McElice , Robert B. Ash & Carol Ash, "Introduction to discrete Mathematics", Tata McGraw Hill
6. Deo N., "Graph Theory with Applications to Engineering and Computer Science", PHI, 1980
7. Tremblay and Manohar, "Discrete mathematical structures with applications to computer science", McGraw Hill, 1975
8. Kolamn, Busby and Ross, "Discrete mathematical structures", 3/ed, PHI, 1996.
9. Fraleigh J. B., "A first course in abstract algebra Narosa", 1990
10. Smullyan R. M., "First Order Logic Springer Verlag", 1968

Reference:
1.Lipschutz—2000 Solved Problems in Discrete Mathematics, TMH
2.Balakrishnan—Graph Theory (Schaum),MH
3.Hararay—Graph Theory

MI102) Data Structure with C/C++:

Overview of C++ language
Time and Space analysis of Algorithms - Order Notations. Linear Data Structures - Sequential representations - Arrays and Lists, Stacks, Queues and Dequeues, strings, Application.

Linear Data Structures, Link Representation - Linear linked lists, Circularly linked lists. Doubly linked lists, application.

Recursion - Design of recursive algorithms, Tail Recursion, When not to use recursion, Removal of recursion.

Non-linear Data Structure: Trees - Binary Trees, Traversals and Threads, Binary Search Trees, Insertion and Deletion algorithms, Height-balanced and weight-balanced trees, B-trees, B+ -trees, Application of trees; Graphs - Representations, Breadth-first and Depth-first Search.

Hashing - Hashing Functions, collision Resolution Techniques.

Sorting and Searching Algorithms, Bubble sort, Selection Sort, Insertion Sort, Quicksort, Merge Sort, Heapsort and Radix Sort.

File Structures - Sequential and Direct Access. Relative Files, Indexed Files - B+ tree as index. Multi-indexed Files, Inverted Files, Hashed Files.

Text books:

> 1. Data Structures and Algorithms – O.G. Kakde and U.A. Deshpande, ISTE/EXCEL BOOKS
>
> 2. Aho Alfred V., Hopperoft John E., UIlman Jeffrey D., "Data Structures and Algorithms", Addison Wesley
> 3. Drozdek A –Data Structures and Algorithms
> 4. Pujari A.K. – Data Mining & Techniques, Universities Press
> 5. Ajay Agarwal- Data Structure Through C, Cyber Tech
> 6.Radhaganesan,P -C and Data Structures-Scitech Publications

References :

> 1.Heileman :data structures algorithms &OOP Tata McGraw Hill
> 2. Data Structures Using C – M.Radhakrishnan and V.Srinivasan, ISTE/EXCEL BOOKS
> *3.* Weiss Mark Allen, "Algorithms, Data Structures, and Problem Solving with C++", Addison Wesley.
> 4. Horowitz Ellis & Sartaj Sahni, "Fundamentals of Data Structures", Galgotria Pub.
> 5.Tanenbaum A. S. , "Data Structures using 'C' "

MI103) Computer Organization & Architechture:

Concepts and Terminology: Digital computer components Hardware & Software and their dual nature, Role of Operating Systems (OS).

The ALU: ALU organization, Integer representation, Serial and Parallel Adders, is 1s and 2s complement arithmetic, Multiplication of signed binary numbers, Floating point number arithmetic, Overflow detection, Status flags.

Memory Unit: Memory classification, Bipolar and MOS storage cells. Organization of RAM, address decoding, Registers and stack, ROM and PROM-basic cell. Organization and erasing schemes, Magnetic memories-recording formats and methods. Disk and tape Units. Concept of memory map. Timing diagrams, T-States, Timing diagram Controlling arithmetic and logic instructions. Instruction sequencing with examples. Introduction to Micro-programming, Variations in Micro-programming configuration.

General Organization: Instruction work formats, Addressing modes registers, Von-Neumann concept, Interconnecting system components, Interfacing buses, Timing diagrams, Examples from popular machines.

Text books :

> 1   Hayes J. P., "Computer Architecture & Organisation", McGraw Hill,
> 2   Hamacher, "Computer Organisation",
> 3   Computer Organization and System Software, EXCEL BOOKS
> > 4. Chaudhuri P. Pal, "Computer Organisation & Design", PHI,
> > 5. Mano, M.M., "Computer System Architecture", PHI.
> > 6. Burd- System Architecture,Vikas

MI104) Data Base Management System (DBMS):

Introduction: Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Three Schema architecture of DBMS.

Entity-Relationship Model: Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features.

Relational Model: Structure of relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Views, Modifications Of the Database.

SQL and Integrity Constraints: Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Subqueries, Database security application development using SQL, Stored procedures and triggers.

Relational Database Design: Functional Dependency, Different anamolies in designing a Database., Normalization using funtional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Nomalization using multi-valued depedencies, 4NF, 5NF

Internals of RDBMS: Physical data structures, Query optimization : join algorithm, statistics and cost bas optimization. Transaction processing, Concurrency control and Recovery Management : transaction model properties, state serializability, lock base protocols, two phase locking.

File Organization & Index Structures: File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree .

Text Books:

1. Henry F. Korth and Silberschatz Abraham, "Database System Concepts", Mc.Graw Hill.
2. Elmasri Ramez and Novathe Shamkant, "Fundamentals of Database Systems", Benjamin Cummings Publishing. Company.
3. Ramakrishnan: Database Management System , McGraw-Hill
4. Gray Jim and Reuter Address, "Transaction Processing : Concepts and Techniques", Moragan Kauffman Publishers.
5. Jain: Advanced Database Management System CyberTech
6. Date C. J., "Introduction to Database Management", Vol. I, II, III, Addison Wesley.
7. Ullman JD., "Principles of Database Systems", Galgottia Publication.
8. Krishnan, Windows and MS Office 2000 with Database Concepts, Scitech
9. Feuerstein ; Oracle PL/SQL Programming – 3/edition, Shroff Publishers / O'reilly

Reference:

1. James Martin, "Principles of Database Management Systems", 1985, Prentice Hall of India, New Delhi
2. "Fundamentals of Database Systems", Ramez Elmasri, Shamkant B.Navathe, Addison Wesley Publishing Edition
3. "Database Management Systems", Arun K.Majumdar, Pritimay Bhattacharya, Tata McGraw Hill

MI105) Business Communication:

Technical Report writing, Technical Notes preparation, Letter Writing, Business Communication Practices, Précis, Proposal Writing. Presentations: The secrets of an effective presentation. Interview sessions- do's and don'ts of facing a successful interview. Conversion practice is done on given situation topics. Group Discussions: language of conversion & strategies.

Text:
> 1. Sharma—Business Correspondence & Report Writing, TMH
> 2. Prasad—Group Discussion & Interview (With Audio Cassette) , TMH

Reference:
1. Sashi Kumar—Spoken English (with Cassette) , TMH

MI191) Programming & Data Structure with C++:

Experiments should include but not limited to the implementations through C++ of the followings:
array operations, Stacks and Queues : adding, deleting elements Circular Queue : Adding & deleting elements Merging Problem : Evaluation of expressions operations on Multiple stacks & queues : Implementation of linked lists: inserting, deleting, inverting a linked list. Implementation of stacks & queues using linked lists: Polynomial addition, Polynomial multiplication
Sparse Matrices : Multiplication, addition. Recursive and Nonrecursive traversal of Trees
Threaded binary tree traversal. AVL tree implementation. Application of Trees. Application of sorting and searching algorithms, Hash tables implementation, searching, inserting and deleting, searching & sorting techniques.

MI192) DBMS Lab:

The experiments should include the following, but not limited to:

Structured Query Language
Creating Database : Creating a Database, Creating a Table, Specifying Relational Data Types, Specifying Constraints, Creating Indexes,
Table and Record Handling: INSERT statement, Using SELECT and INSERT together, DELETE, UPDATE, TRUNCATE statements, DROP, ALTER statements
Retrieving Data from a Database: The SELECT statement, Using the WHERE clause, Using Logical Operators in the WHERE clause, Using IN, BETWEEN, LIKE , ORDER BY, GROUP BY and HAVING,Clause, Using Aggregate Functions, Combining Tables, Using JOINS, Subqueries
Database Management: Creating Views, Creating Column Aliases, Creating Database Users, Using GRANT and REVOKE, Cursors in Oracle PL / SQL, Writing Oracle PL / SQL Stored Procedures

MI193) Personality Development:

Topics to be covered and number of hours required for it:

1. Introductory lecture is to be given to the students so that they get a clear idea of the syllabus and understand the need for having such a practice lab in the first place(3 hours)
2. Conversion practice is done on given situation topics. The students are also made to listen to pre-recorded cassettes produced by British Council and also by the Universities of Oxford and Cambridge (6 hours)
3. Group Discussions:- The students are made to understand the difference between the language of conversion and group discussion. Strategies of such discussions are to teach to them. It is also helpful to use videocassettes produced by the U.G.C. on topics like group-discussion. After wards the class is divided into groups and the students have to discuss on given topics on current socio-economic-political-educational importance(12 hours)
4. Interview sessions-students are taught the do's and don'ts of facing a successful interview. They then have to face rigorous practices of mock-interviews. There simulations of real life interview sessions where students have to face an interview panel(12 hours)
5. Presentations: The secrets of an effective presentation are taught to the students. Then each and every student has to make lab presentations with the help of the Overhead projector/ using power point presentation and other audio-visual aids in the laboratory. They also have to face the question answer sessions at the end of their presentation (12 hours)

6. Classes are also allotted to prepare the students for competitive examinations like the T.O.E.F.L. by making the students listen to specially produced C.D. cassettes of such examinations (3 hours)

SEMESTER – II

MI201) Library & Information Sc.:

Library as social institution, Different types of libraries, Normative principles of Library & Information Science: Five laws of library and information Sc, Public Library: Library legislation, Academic Library, Special Library, Laws for bibliographic control: IPR with special reference to D.B. Act, Copyright Act, library & information management, Promoting agencies of library and information services

Reading List:

1. Feather (John) "The Information Society", 1998, The Library Association, London.
2. Dearnby (James), Feather (John) "The Wired World", 2001, The Library Association, London.
3. ATHERTON(Pauline A). "Putting knowledge to work", Vikas, New Delhi,
4. RANGANATHAN (S.R), " Five laws of Library Sc.", UBSPD, New Delhi

MI202) Object Technology:

Introduction: Why object orientation, History and development of Object Oriented Programming language, concepts of object oriented programming language**.**

Object oriented analysis Usecase diagram; Major and minor elements, Object, Class.

Object oriented design: Relationships among objects, aggregation, links, relationships among classes-association, aggregation, using, instantiation, meta-class, grouping constructs.

Basic concepts of object oriented programming using Java :
Object, class, message passing, encapsulation, polymorphism, aggregation, threading, applet programming, difference between OOP and other conventional programming-advantages and disadvantages.

Fundamentals of Object Oriented design in UML :Static and dynamic models, why modeling, UML

diagrams: Class diagram, interaction diagram: collaboration diagram, sequence diagram, statechart

diagram, activity diagram, implementation diagram, UML extensibility- model constraints and comments,

Note, Stereotype.

Text Books :

1. Ali Bahrami, - "Object –Oriented System Development" - Mc Graw Hill.
2. Rambaugh, James Michael, Blaha - "Object Oriented Modelling and Design" - Prentice Hall India/ Pearson Education
3. Bruce, Foundations of Object Oriented Languages, PHI
4. Patrick Naughton, Herbert Schildt – "The complete reference-Java2" - TMH

5. Priestley – " Practical Object Oriented Design using UML" - TMH
6. Jana, C++ & Object Oriented Programming, PHI
7. Alhir, learning UML, SPD/O'Reily

Reference Books:

1. Page Jones, Meiler - "Fundamentals of object oriented design in UML"
2. Roff: UML: A Beginner's Guide TMH
3. Rajaram: Object Oriented Programming and C++, New Age International
4. Mahapatra: Introduction to System Dynamic Modelling, Universities Press
5. Muller : Instant UML, Shroff Publishers / Wrox
6. Srimathi, Object Oriented Analysis & Design Using UML, Scitech
7. Alhir : UML in a Nutshell, Shroff Publishers / O'reilly
8. Olshevsky : Revolutionary guide to Object Oriented Programming using C++, Shroff / Wrox

MI203) Operating System & System Programming:

Introduction Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, time-sharing, real-time, distributed, parallel.

System Structure Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

Process Management *Processes :* Concept of processes, process scheduling, operations on processes, co-operating processes, inter-process communication.

Threads: overview, benefits of threads, user and kernel threads.

CPU scheduling: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, priority), algorithm evaluation, multi-processor scheduling.

Process Synchronization: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.

Deadlocks: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Storage Management

Memory Management: background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

Virtual Memory: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.

File Systems: file concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance.

I/O Management: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance.

Disk Management: disk structure, disk scheduling (FCFS, SSTF, SCAN,C-SCAN) , disk reliability, disk formatting, boot block, bad blocks.

Protection & Security

Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

Text Books / References :

1. Milenkovie M., "Operating System : Concept & Design", McGraw Hill.
2. Tanenbaum A.S., "Operating System Design & Implementation", Practice Hall NJ.
3. Silbersehatz A. and Peterson J. L., "Operating System Concepts", Wiley.
4. Dhamdhere: Operating System TMH
5. Stalling, William, "Operating Systems", Maxwell McMillan International Editions, 1992.
6. Dietel H. N., "An Introduction to Operating Systems", Addison Wesley.
    Balakrishna Prasad, Operating Systems, Scitech

MI204) Software Engineering:

Overview of System Analysis & Design , Business System Concept, System Development Life Cycle, Waterfall Model , Spiral Model, Feasibility Analysis, Technical Feasibility, Cost- Benefit Analysis, COCOMO model.
System Requirement Specification – DFD, Data Dictionary, ER diagram, Process Organization & Interactions.
System Design – Problem Partitioning, Top-Down And Bottop-Up design ;Decision tree, decision table and structured English; Functional vs. Object- Oriented approach.
Coding & Documentation - Structured Programming, OO Programming, Information Hiding, Reuse, System Documentation.
Testing – Levels of Testing, Integration Testing, Test case Specification, Reliability Assessment . , Validation & Verification Metrics, Monitoring & Control.
Software Project Management – Project Scheduling , Staffing, Software Configuration Management, Quality Assurance, Project Monitoring. CASE TOOLS : Concepts, use and application.
Books:
   Text:
  1**.** R. G. Pressman – Software Engineering, TMH
  2**.**Behforooz, Software Engineering Fundamentals,OUP
  3. Ghezzi, Software Engineering, PHI
   4.Pankaj Jalote – An Integrated Approach to Software Engineering, NAROSA.
    5.Object Oriented & Classical Software Engineering(Fifth Edition),   SCHACH,TMH
  6.Vans Vlet, Software Engineering, SPD
  7.Uma, Essentials of Software Engineering, Jaico
   8.Sommerville, Ian – Software Engineering, Pearson Education
  9.Benmenachen, Software Quality, Vikas
  Reference:
  1.   IEEE Standards on Software Engineering.
  2.   Kane, Software Defect Prevention, SPD

MI205) Information Theory:

Sources - Memory less and Markov; Information; Entropy; Extended Source, Shannon's noiseless coding theorem; source coding; Mutual Information; Channel Capacity, BSC and other channels, Shannon's Channel Capacity Theorem,

Channel Coding – Block Coding, Convolution coding, Majority logic decoding, Majority decoding algorithm, Coding gains and performance

Books:

1) Digital Communication Technique – Taub Schilling

2) Digital Communication Technique – J. Das

3) Digital Communication Technique – Rodey Colen

MI291) Object Technology Lab with Java:

1. Assignments on class, constructor, overloading, inheritance, overriding
2. Assignments on wrapper class, vectors, arrays
3. Assignments on developing interfaces- multiple inheritance, extending interfaces
4. Assignments on creating and accessing packages
5. Assignments on multithreaded programming, handling errors and exceptions, applet programming and graphics programming
6. Use of CASE tools

Note: Use Java as programming language.

MI292) Operating System (OS) Lab

1. **Shell programming [6P]:** creating a script, making a script executable, shell syntax (variables, conditions, control structures, functions, commands).
2. **Process [6P]:** starting new process, replacing a process image, duplicating a process image, waiting for a process, zombie process.
3. **Signal [9P]:** signal handling, sending signals, signal interface, signal sets.
4. **Semaphore [6P]:** programming with semaphores (use functions semctl, semget, semop, set_semvalue, del_semvalue, semaphore_p, semaphore_v).
5. **POSIX Threads [9P]:** programming with pthread functions(viz. pthread_create, pthread_join, pthread_exit, pthread_attr_init, pthread_cancel)
6. **Inter-process communication [9P]:** pipes(use functions pipe, popen, pclose), named pipes(FIFOs, accessing FIFO)

MI293) System Software & Administration Lab:

- Packet Monitoring software (**tcpdump, snort, ethereal**)
- Trace route, Ping, Finger, Nmap
- Server configuration (FTP, SMTP, DNS)
- NFS Configuration
- Firewall Configuration using **iptables/ipchains** (Linux only)
- Experiments using Turbo C Assembler

Note: All the above experiments may be performed in both Unix /Linux & Windows

SEMESTER – III

MI301) Computer Networking:

Overview of data communication and Networking: Introduction; Data communications: components, data representation(ASCII,ISO etc.),direction of data flow(simplex, half duplex, full duplex); Networks: distributed processing, network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN,WAN);Internet: brief history, internet today; Protocols and standards; Reference models: OSI reference model, TCP/IP reference model, their comparative study.

Physical level: Overview of data(analog & digital), signal(analog & digital), transmission (analog & digital)& transmission media (guided & non-guided); TDM, FDM, WDM; Circuit switching: time division & space division switch, TDM bus; Telephone network;

Data link layer: Types of errors, framing(character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC;

Medium access sub layer: Point to point protocol, LCP, NCP, FDDI, token bus, token ring; Reservation, polling, concentration; Multiple access protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA; Traditional Ethernet, fast Ethernet*;*

Network layer Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing : Internet address, classful address, subnetting; Routing : techniques, static vs. dynamic routing , routing table for classful address; Routing algorithms: shortest path algorithm, flooding, distance vector routing, link state routing; Protocols: ARP, RARP, IP, ICMP, IPV6; Unicast and multicast routing protocols.

Transport layer: Process to process delivery; UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve Qos.

Application layer: DNS; SMTP, SNMP, FTP, HTTP & WWW; Security: Cryptography, user authentication, security protocols in internet, Firewalls.

Modern topics ISDN services & ATM ; DSL technology, Cable modem, Sonet.
Wireless LAN: IEEE 802.11; Introduction to blue-tooth, VLAN's, Cellular telephony & Satellite network.

Text Books:
1. B. A. Forouzan – "Data Communications and Networking (3rd Ed.) " – TMH
2. A. S. Tanenbaum – "Computer Networks (4th Ed.)" – Pearson Education/PHI
3. W. Stallings – "Data and Computer Communications (5th Ed.)" – PHI/ Pearson Education
4. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP
5. Black, Data & Computer Communication, PHI
6. Miller, data Communication & Network, Vikas
7. Miller, Digital & Data Communication, Jaico
8. Shay, Understanding Data Communication & Network, Vikas

Reference Books:
1. Kurose and Rose – " Computer Networking -A top down approach featuring the internet" – Pearson Education
2. Leon, Garica, Widjaja – "Communication Networks" – TMH
3. Walrand – "Communication Networks" – TMH.
4. Comer – "Internetworking with TCP/IP, vol. 1, 2, 3(4th Ed.)" – Pearson Education/PHI

MI302) Computer Graphics & Multimedia

Introduction to computer graphics & graphics systems
Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software.

Scan conversion
Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

2D transformation & viewing

Basic transformations: translation , rotation, scaling ; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear;

Transformation of points, lines , parallel lines, intersecting lines. Viewing pipeline, Window to viewport co-ordinate transformation , clipping operations , point clipping , line clipping, clipping circles , polygons & ellipse.

3D transformation & viewing

3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, viewport clipping, 3D viewing.

Curves

Curve representation, surfaces , designs , Bezier curves , B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves.

Hidden surfaces

Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods , fractal - geometry.

Color & shading models

Light & color model; interpolative shading model; Texture;

Multimedia Introduction to Multimedia: Concepts, uses of multimedia, hypertext and hypermedia.; Image, video and audio standards.

Audio: digital audio, MIDI, processing sound, sampling, compression.

Video: MPEG compression standards, compression through spatial and temporal redundancy, inter-frame and intra-frame compression .

Animation: types, techniques, key frame animation, utility, morphing.

Virtual Reality concepts.

Text Books:
1. Hearn, Baker – " Computer Graphics (C version 2nd Ed.)" – Pearson education
2. Z. Xiang, R. Plastock – " Schaum's outlines Computer Graphics (2nd Ed.)" – TMH
3. D. F. Rogers, J. A. Adams – " Mathematical Elements for Computer Graphics (2nd Ed.)" – TMH
4. Mukherjee, Fundamentals of Computer graphics & Multimedia, PHI
5. Sanhker, Multimedia –A Practical Approach, Jaico
6. Buford J. K. – "Multimedia Systems" – Pearson Education
7. Andleigh & Thakrar, Multimedia, PHI
8. Mukherjee Arup, Introduction to Computer Graphics, Vikas
9. Hill,Computer Graphics using open GL, Pearson Education

Reference Books:
1. Foley, Vandam, Feiner, Hughes – "Computer Graphics principles (2nd Ed.) – Pearson Education.
2. W. M. Newman, R. F. Sproull – "Principles of Interactive computer Graphics" – TMH.
3. Elsom Cook – "Principles of Interactive Multimedia" – McGraw Hill

MI303) Data Communication Principles

Amplitude and Frequency Modulation – their generation and detection Bandwidth requirements Low Power and High Modulators and Modulated amplifiers. Superheterodyne detection. Signal to Noise ratio of A.M. and P.M. transmission.

A/D, D/A Converters. Shannon's sampling Theorem. PAM, PWM, PPM and PCM. Their generation and detection.

Digital Modulation : ASK, FSK, PSK performance evaluation. Time Division Multiplexing and Demultiplexing. Modems, Error control and coding, Channel capacity.

Data Transmission Synchronization, Data protection, error detection and correlation.

Elements of Satellite Communication tracking and control.

Text :
1. Taub H. and Shilling D. L., "Principles of Communication Systems", 2/e,TMH
2. Carlson R. B., "Communication Systems ,4/e, Mc.Graw Hill
3. Haykin S. S., "An Introduction to Analog and Digital Communication Systems", Wiley Eastern.
4. Lathi B. P., "Communication Systems", John Wiley.

Reference:
1.Kennedy—Electronic Communication Systems, 4/e , TMH

MI304) Information Law & Policy

Information Technology Act, Information Security Protocols, Non-repudiation services, related protocols,

Fairness in Information Exchanges Protocols, Trusted Third Party, its use as Adjudicator, message

authenticator, Information Security standards, Information Security Infrastructure.

Book:

1)Non-repudiation in e-commerce by Z.Zhuo

2) Information Technology Act.

MI305) Web Technology & Advanced Java Programming

Client & server side programming.
Enterprise architecture styles: Single tier , 2-tier , 3-tier, n-tier; Relative comparison of the different layers of architectures.
MVC Architecture: Explanation, Need, Drawbacks, J2EE WEB SERVICES, Different components & containers.
Servlet: Introduction, Advantages over CGI, How it works?, Servlet life cycle, Servlet API (Different interfaces & classes of generic servlet & HTTP servlet), Accessing user information by means of Request & Response, Servlet session management techniques and relative comparison.
JSP: Introduction, Comparison between JSP & servlet., Architecture/Life cycle, Different types of JSP architectures and relative comparison.; JSP tags ,Directives, Scripting elements, Actions; JSP implicit objects, Accessing user information using implicit objects.
EJB :Introduction, Comparison of EJB & Java Beans , Applications, Drawbacks, Different types of enterprise beans ,Services provided by EJB container.
RMI: Introduction and applications, Architecture ,Use of RMI Registry.
JNDI: Introduction and applications, Comparison between LDAP and JNDI
JDO (Java Data Objects): Introduction, Integration of EJB and JDO, JDO & RMI
 JINI :Introduction, Applications
JDBC: Introduction, Database driver   ,Different approaches to connect an application to a database server, Establishing a database connection and executing SQL statements, JDBC prepared statements, JDBC data sources.

XML: Java & XML, XML syntax, Document type definition., Parsers, SAX parsers, DOM parsers, SAX vs. Dom, JAXP and JAXB.

Text :
1. "Professional JAVA Server Programming", Allamaraju and Buest ,SPD Publication
2. "Beginning J2EE 1.4" Ivor Horton, SPD Publication.
3. "Advanced Programming for JAVA 2 Platform" Austin and Pawlan, Pearson

Reference Books:
1. Internet & Java Programming by Krishnamoorthy & S. Prabhu(New Age Publication)

MI391) Multimedia & Graphics Lab   :

- Point plotting, line & regular figure algorithms
- Raster scan line & circle drawing algorithms
- Clipping & Windowing algorithms for points, lines & polygons
- 2-D / 3-D transformations
- Simple fractals representation
- Filling algorithms
- Web document creation using Dreamweaver.

Creating Animation using Flash.

MI392) Networking   Lab:

- IPC (Message queue)
- NIC Installation & Configuration (Windows/Linux)
- Familiarization with
  - Networking cables (CAT5, UTP)
  - Connectors (RJ45, T-connector)
  - Hubs, Switches
- TCP/UDP Socket Programming
- Multicast & Broadcast Sockets
- Implementation of a Prototype Multithreaded Server
- Implementation of
  - Data Link Layer Flow Control Mechanism (Stop & Wait, Sliding Window)
  - Data Link Layer Error Detection Mechanism (Cyclic Redundancy Check)

Data Link Layer Error Control Mechanism (Selective Repeat, Go Back N)

MI393) Web technology Lab
Experiments pertaining to the paper MI305

SEMESTER – IV

MI401) Soft Computing

Introduction to artificial neural network
Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Applications of Artificial Neural Networks.

Competitive learning networks, Kohonen self organizing networks, Hebbian learning; Hopfield Networks, Associative Memories, The boltzman machine; Applications.

Fuzzy Logic

Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations. Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.Fuzzy Logic: Classical Logic.

Genetic algorithms(Gas),Evolution strategies(Ess),Evolutionary   programming(EP),Genetic Programming(GP),Selecting,crossover,mutation,schema analysis,analysis of selection algorithms;convergence;Markov & other stochastic models.

Other Soft computing approaches

Simulated Annealing, Tabu Search, Ant colony based optimisation, etc.

Text:
1. "Neuro-Fuzzy and Soft computing", Jang, Sun, Mizutani, Pearson
2. "Neural networks: a comprehensive foundation", Haykin, Pearson
3. "Genetic Algorithms", Goldberg, Pearson
4. "Fuzzy Sets & Fuzzy Logic", G.J. Klir & B. Yuan, PHI.

Reference:
1. "An Introduction to Neural Networks", Anderson J.A., PHI, 1999.
2. "Introduction to the Theory of Neural Computation", Hertz J. Krogh, R.G. Palmer, Addison-Wesley, California, 1991.
3. "An Introduction to Genetic Algorithm", Melanie Mitchell, PHI, 1998.
4. "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.

"Neural Networks: Algorithms, Applications and Programming Techniques", Freeman J.A. & D.M. Skapura, Addison Wesley, Reading, Mass, (1992).

MI402) Digital Image Processing

Image digital representation. Elements of visual perception. Sampling and quantisation. Image processing system elements. Fourier transforms. Extension to 2-D, DCT, Walsh transform, Hadamard transforms. Enhancement and segmentation. Point and region dependent techniques. Image encoding: Fidelity criteria. Transform compression. KL, Fourier, DCT, Spatial compression, Run length coding. Huffman and contour coding. Restoration Models: Constrained & unconstrained, Inverse filtering, Least squares filtering, Recursive filtering.

Books:
1. Digital Image Processing, Gonzalves,Pearson
2. Digital Image Processing, Jahne, Springer India
3.Digital Image Processing & Analysis,Chanda & Majumder,PHI
4.Fundamentals of Digital Image Processing, Jain, PHI
5.Image Processing, Analysis & Machine Vision, Sonka, VIKAS

MI403) Values & Ethics in Profession

Science, Technology and Engineering as Knowledge and as Social and Professional Activities

Rapid Technological growth and depletion of resources. Reports of the Club of Rome. Limits to growth;

sustainable development. Energy Crisis; Renewable Energy Resources.

Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations. Environmental Ethics. Appropriate Technology Movement of Schumacher: later developments. Technology and developing nations. Problems of Technology transfer. Technology assessment/ impact analysis; Industrial hazards and safety, safety regulations safety engineering. Politics and technology, authorization versus democratic control of technology; Human Operator in Engineering projects and industries. Problems of man machine interaction. Impact of assembly line and automation. Human centred Technology

Ethics of Profession:

Engineering profession: Ethical issues in engineering practice. Conflicts between business demands and professional ideals. Social and ethical Responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond. Case studies.

Profession and Human Values

Value Crisis in contemporary society. Nature of values: Value Spectrum of a 'good' life

Psychological values: Integrated personality; mental health. Societal values: The modern search for a 'good' society, justice, democracy, secularism, rule of law; values in Indian Constitution. Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity

Moral and ethical values: Nature of moral judgments; canons of ethics; Ethics of virtue; ethics of duty; ethics of responsibility. Work ethics, professional ethics.

Books:

1.Blending the best of the East & West, Dr. Subir Chowdhury, EXCEL

2.Ethics & Mgmt. & Indian Ethos, Ghosh, VIKAS

3.Business Ethics,Pherwani,EPH

4.Ethics,Indian Ethos & Mgmt., Balachandran,Raja,Nair, Shroff Publishers

5.Business Ethics: concept and cases, Velasquez, Pearson

MI404) E-Commerce

Electronic Commerce : Overview, Definitions, Advantages & Disadvantages of E – Commerce, Threats of E – Commerce, Managerial Prospective, Rules & Regulations For Controlling E – Commerce, Cyber Laws. **Technologies :** Relationship Between E – Commerce & Networking, Different Types of Networking For E – Commerce, Internet, Intranet & Extranet, EDI Systems

Wireless Application Protocol : Definition, Hand Held Devices, Mobility & Commerce, Mobile Computing, Wireless Web, Web Security, Infrastructure Requirement For E – Commerce .

Business Models of e – commerce : Model Based On Transaction Type, Model Based On Transaction Party - B2B, B2C, C2B, C2C, E – Governance.

E – strategy : Overview, Strategic Methods for developing E – commerce.
Four C's : (Convergence, Collaborative Computing, Content Management & Call Center).

Convergence : Technological Advances in Convergence – Types, Convergence and its implications, Convergence & Electronic Commerce.

Collaborative Computing : Collaborative product development, contract as per CAD, Simultaneous Collaboration, Security.

Content Management : Definition of content, Authoring Tools & Content Management, Content – partnership, repositories, convergence, providers, Web Traffic & Traffic Management ; Content Marketing.

Call Center : Definition, Need, Tasks Handled, Mode of Operation, Equipment , Strength & Weaknesses of Call Center, Customer Premises Equipment (CPE).

Supply Chain Management : E – logistics, Supply Chain Portal, Supply Chain Planning Tools (SCP Tools), Supply Chain Execution (SCE), SCE - Framework, Internet's effect on Supply Chain Power.

E – Payment Mechanism : Payment through card system, E – Cheque, E – Cash, E – Payment Threats & Protections.

E – Marketing :. Home –shopping, E-Marketing, Tele-marketing
Electronic Data Interchange (EDI) : Meaning, Benefits, Concepts, Application, EDI Model, Protocols (UN EDI FACT / GTDI, ANSI X – 12), Data Encryption (DES / RSA).

Risk of E – Commerce : Overview, Security for E – Commerce, Security Standards, Firewall, Cryptography, Key Management, Password Systems, Digital certificates, Digital signatures.

Enterprise Resource Planning (ERP) : Features, capabilities and Overview of Commercial Software, re-engineering work processes for IT applications, Business Process Redesign, Knowledge engineering and data warehouse .

Business Modules: Finance, Manufacturing (Production), Human Resources, Plant Maintenance,Materials Management, QualityManagement, Sales&Distribution
ERPPackage, **ERP Market:** ERP Market Place, SAP AG, PeopleSoft, BAAN, JD Edwards, Oracle Corporation, ERP-Present and Future: Enterprise Application Integration (EAI), ERP and E-Commerce, ERP and Internet, Future Directions in ERP
Reference :

1. E-Commerce,M.M. Oka, EPH
2. Kalakotia, Whinston : Frontiers of Electronic Commerce , Pearson Education.
3. Bhaskar Bharat : Electronic Commerce - Technologies & Applications.TMH
4. Loshin Pete, Murphy P.A. : Electronic Commerce , Jaico Publishing Housing.
5. Murthy : E – Commerce , Himalaya Publishing.
6. E – Commerce : Strategy Technologies & Applications, Tata McGraw Hill.
7. Global E-Commerce, J. Christopher & T.H.K. Clerk, University Press
8. Beginning E-Commerce, Reynolds, SPD
9. Krishnamurthy, E-Commerce Mgmt, Vikas

Elective Papers(MI405)

a) Wireless & Mobile Computing

Introduction to Personal Communications Services (PCS): PCS Architecture, Mobility management, Networks signalling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling.
General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.
                                                                                    Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML). Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.
Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems. Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.

Server-side programming in Java, Pervasive web application architecture, Device independent example application

 Text :
   2. "Pervasive Computing", Burkhardt, Pearson
   3. "Mobile Communication", J. Schiller, Pearson
   4. "Wireless and Mobile Networks Architectures", Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001
   5. "Mobile and Personal Communication systems and services", Raj Pandya, Prentice Hall of India, 2001.

Reference :
   1. "Guide to Designing and Implementing wireless LANs", Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
   2. "Wireless Web Development", Ray Rischpater, Springer Publishing,
   3. "The Wireless Application Protocol", Sandeep Singhal, Pearson .
"Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers,

b) Artificial Intelligence (AI)

Overview of Artificial intelligence- Problems of AI, AI technique, Tic – Tac – Toe problem.Problems, Problem Space & search.Heuristic Search Techniques, Knowledge representation issues.Representing knowledge using rules.Symbolic reasoning under uncertainty.

Statistical reasoning.Weak slot & filler structures.Strong slot & filler structures.

Game planning –Minimax search procedure, adding alpha beta cut-off's, iterative deepening,Planning.Natural language processing, Understanding.Learning – induction & explanation based learning.Expert systems- expert system shells, knowledge acquisition.

Basic knowledge of programming language like Prolog & Lisp.

Books:

1.Artificial Intelligence, Ritch & Knight, TMH

2.Introduction to Artificial Intelligence & Expert Systems, Patterson, PHI

3.Poole, Computational Intelligence, OUP

4.Logic & Prolog Programming, Saroj Kaushik, New Age International

5..Expert Systems, Giarranto, VIKAS
6. Artificial Intelligence, Russel, Pearson

c) Image Processing & Pattern Recognition (PR)

Image digital representation. Elements of visual perception. Sampling and quantisation. Image processing system elements. Fourier transforms. Extension to 2-D, DCT, Walsh transform, Hadamard transforms. Enhancement and segmentation. Point and region dependent techniques. Image encoding: Fidelity criteria. Transform compression. KL, Fourier, DCT, Spatial compression, Run length coding. Huffman and contour coding. Restoration Models: Constrained & unconstrained, Inverse filtering, Least squares filtering, Recursive filtering.

The nature of statistical pattern recognition; Three learning paradigms; The sub-problems of pattern recognition; The basic structure of a pattern recognition system; Comparing classifiers.

General framework; Optimal decisions; Classification; Simple performance bounds.

Basic statistical issues; Sources of classification error; Bias and variance; Three approaches to classification: density estimation, regression and discriminant analysis; Empirical error criteria; Optimization methods; Failure of MLE;

Linear and quadratic discriminants; Shrinkage; Logistic classification; Generalized linear classifiers; Perceptrons; Maximum Margin; Error Correcting Codes;

Sample error and true error; Error rate estimation; Confidence intervals; Resampling methods; Regularization; Model selection; Minimum description length; Comparing classifiers.

Books:
1. Digital Image Processing, Gonzalves,Pearson
2. Digital Image Processing, Jahne, Springer India
3.Digital Image Processing & Analysis,Chanda & Majumder,PHI
4.Fundamentals of Digital Image Processing, Jain, PHI
5.Image Processing, Analysis & Machine Vision, Sonka, VIKAS