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SYLLABUS FOR MCA PROGRAMME

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1.0 Objectives of the MCA course

The M.C.A. program prepares students to take up positions as systems analysts, systems designers, programmers, and managers in any field related to information technology. The program, therefore, aims at imparting comprehensive knowledge with equal emphasis on theory and practice. The M.C.A. students are encouraged to spend a full semester working in the industry/ in the institute giving them insight into the workings of the IT world. However, the course curriculum will have enough flexibility to enable a student to undertake advance studies in Computer Science later on.

2.0 Course Structure

The course is to be completed in 6 semesters. The first semester will comprise mostly of common subjects needed to build a base for the subjects to follow in pursuance of the objectives of the course. The 2nd to the 5th semesters will be mostly divided into core subjects and electives, which offer the student a choice to build expertise in some fields based on personal choice. The last semester will be devoted to project work testing the student's application in the fields studied so far and provide valuable experience before stepping into the professional world of Information Technology.

3.0 Course Outline Semester Wise

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Semester 1

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Theory		Contact Hrs.	Credit
Code	**Subject**	**L-T-P**	
PCS1001	Programming in 'C'	3-0-0	3
PES2001	Microprocessor and Assembly Language Programming	3-1-0	4
SCM2005	Discrete Mathematics	3-1-0	4
HSS1001	Communicative English	2-0-0	2
HSS1901	Communicative Practice Laboratory - I	0-0-2	1
MGT3001	Engineering Economics and Costing	3-0-0	3
PCS2901	Lab-I: 'C' Programming	0-0-6	4
PMC2902	Lab- II: Assembly Language Programming	0-0-3	2
	Total		**23**

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Semester 2

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Theory		Contact Hrs.	Credit
Code	**Subject**	**L-T-P**	
PCS1002	Data Structures Using 'C'	3-0-0	3
PCS2001	Computer System Architecture	3-1-0	4
PCS2002	Object Oriented Programming using C++	3-0-0	3
SCM2006	Numerical Methods	3-1-0	4
HSS1002	Business Communication in English	2-0-0	2
HSS1902	Communicative Practice Laboratory - II	0-0-2	1
PCS2903	Lab III : Data Structure in 'C' Laboratory	0-0-3	2
PMC2904	Lab IV : OOP with C++	0-0-6	4
PSV2001	Seminar	0-0-3	2
	Total		**25**

Semester 3

Theory		Contact Hrs.	Credit
Code	**Subject**	**L-T-P**	
PCS 3001	Analysis and Design of Algorithms	3-1-0	4
PCS 3002	Operating System	3-1-0	4
MGT 3002	Management Information System	3-0-0	3
PCS 3003	Relational Database Management Systems	3-0-0	3
MGT 3003	Financial and Management Accounting	3-0-0	3
PMC 3901	Operating System Laboratory	0-0-6	4
PMC 3902	RDBMS Laboratory	0-0-6	4
	Total		**25**

Semester 4

Theory		Contact Hrs.	Credit
Code	**Subject**	**L-T-P**	
PCS 3004	Software Engineering & OOAD	3-1-0	4
PCS 3006	Programming with Java.	3-1-0	4
PCS 3007	Computer Graphics	3-1-0	4
MGT 3004	Human Resource Management	3-0-0	3
PMC 3903	Quantitative Techniques- I	3-0-0	3
PMC 3904	Computer Graphics Laboratory	0-0-6	4
PSV 3001	Programming with Java Laboratory	0-0-6	4
SEM 3901	Seminar	0-0-3	2
	Total		**28**

Semester 5

Theory		Contact Hrs.	Credit
Code	**Subject**	**L-T-P**	
PCS 5008	Internet Technology	3-1-0	4
PMC 5905	Quantitative Techniques-II	3-1-0	4
PCS 5009	Computer Networks	3-1-0	4
PCS 5010	Enterprise Web-based Computing with Java	3-1-0	4
	Elective I (*Any one*)	3-1-0	4
PEE 5001	Computer Security		
PEE 5002	Image Processing		
PEE 5003	Artificial Intelligence		
PEE 5004	Parallel Computing		
PSV 3905	Enterprise Web based computing with Java	0-0-6	4
PMC 3906	Network Programming using Socket (C / Java)	0-0-6	4
CVV 3901	Comprehensive Viva-Voce (after 5th Semester)		2
	Total		**30**

Semester 6

Theory		Contact Hrs.	Credit
Code	**Subject**	**L-T-P**	
PRJ 6001	Project work (for 16 weeks)		20

(*To be carried out in an industry. There will be one assessment of the project conducted jointly by the supervisor from the industry and the supervisor from the college for four credits. Final evaluation for 16 credits will be done as per section 4.9 of the regulation*)

Semester 3

PCS 3001   ANALYSIS AND DESIGN OF ALGORITHMS

Module I (10 hrs)
Algorithms and Complexity – asymptotic notations, orders, worst-case and average-case, amortized complexity. Basic Techniques – divide & conquer, dynamic programming, greedy method, backtracking,

Module II (10 hrs)
branch and bound, randomization. Data Structures – heaps, search trees, union-find problems. Applications – sorting & searching, combinatorial problems,

Module III (10 hrs)
optimization problems, computational geometric problems, string matching. Graph Algorithms – BFS and DFS, connected components,

Module IV (10 hrs)
spanning trees, shortest paths, max-flow. NP-completeness. Approximation algorithms.

Textbooks :
1.   Horowitz E. & Sahni S., Fundamentals of Computer Algorithms, Galgotia Publications.
2.   Aho, Hopcroft & Ullman, The design and Analysis of Algorithm, Addison - Wesley.

PCS 3002   OPERATING SYSTEMS

Module 1 (9 hrs)
Evolution of Operating Systems: Types of operating systems -Different views of the operating systems - Principles of Design and Implementation. The process concept - system programmer's view of processes - operating system's views of processes - operating system services for process management. Process scheduling - Schedulers - Scheduling Algorithms

Module II (9 hrs)
Structural overview, Concept of process and Process synchronization, Process Management and Scheduling, Hardware requirements: protection, context switching, privileged mode; Threads and their Management; Tools and Constructs for Concurrency, Detection and Prevention of deadlocks, Mutual Exclusion: Algorithms, semaphores - concurrent programming using semaphores.

Module III (10 hrs)
Memory Management: paging, virtual memory management, Contiguous allocation - static, dynamic partitioned memory allocation - segmentation. Non-contiguous allocation - paging - Hardware support - Virtual Memory, Dynamic Resource Allocation.

Module IV (12 hrs)
File Systems: A Simple file system - General model of a file system - Symbolic file system - Access control verification - Logical file system - Physical file system - Allocation strategy module - Device strategy module, I/O initiators, Device handlers - Disk scheduling, Design of IO systems, File Management
Introduction to Unix and Unix commands. Introduction to sed, awk, and grep family

Text Books :

1.   Silberschatzx & Galvin, Operating Systems Concepts, Addison - Wesley.
2.   Tanenbaum, Modern Operating System, Pearson Education.

MGT 3002   MANAGEMENT INFORMATION SYSTEMS

Module I (8 hrs)
Fundamentals of Information Systems, Systems approach to problem solving, Developing is solutions.
Module II (7 hrs)
Corporate databases & database management, Data Organisation, Data models, Data security & Information quality.
Module III (8 hrs)
Transaction Processing Systems, Executive information Systems, Decision Support Systems, Expert Systems, Information Systems in marketing, manufacturing, HRM, Accounting and Finance.

Module IV (7 hrs)
Information Resource Management, planning implementating & controlling Information Systems, Computer crime, Ethics & Society.

Books:

1   Brein James O.- Management Information Systems.
2   Murdick & Ross- Information Systems for Modern Management.
3   Parker C.S.-Management Information Systems-Strategy and Action.
4   Aktas A.Ziya-Structured Analysis and Design of Information Systems.

PCS 3003   RELATIONAL DATABASE MANAGEMENT SYSTEMS

Module I (10 Hours)
Database System Architecture - Data Abstraction, Data Independence, Data Definitions and Data Manipulation Languages.
Data models - Entity Relationship(ER), Mapping ER Model to Relational Model, Network .Relational and Object Oriented Data Models, Integrity Constraints and Data Manipulation Operations.

Module II (10 Hours)
Relation Query Languages, Relational Algebra, Tuple and Domain Relational Calculus, SQL and QBE.
Relational Database Design: Domain and Data dependency, Armstrong's Axioms, Normal Forms, Dependency Preservation, Lossless design, Comparison of Oracle & DB2

Module III (8 Hours)
Query Processing and Optimization: Evaluation of Relational Algebra Expressions, Query Equivalence, Join strategies, Query Optimization Algorithms.

Module IV (12 Hours)
Storage Strategies: Indices, B-Trees, Hashing, Transaction processing: Recovery and Concurrency Control, Locking and Timestamp based Schedulers, Multiversion and Optimistic Concurrency Control Schemes.
Advanced topics: Object-Oriented and Object Relational databases. Logical Databases, Web Databases, Distributed Databases, Data Warehouse and Data Mining.

Text Books:-
1.   Elmaski & Navathe -Fundamentals of Database Systems, 4th Edition, Pearson Education
2.   C.J.Date - An introduction to Database Systems, Pearson Education
3.   Bipin Desai -An introduction to Database System, Galgotia Publication.

MGT 3003   FINANCIAL AND MANAGEMENT ACCOUNTING

Module-I   **Accounting Information :**   **(10 Hrs.)**
                        Concepts, Conventions and Standards. Preparation of Journals, Ledgers, Trial Balance and
Project &   Loss Account and Balance Sheet of a concern. Uses of Accounting
Information.
Module-II   **Accounting relationg to the Companies :   (5 Hrs.)**
                        Sources of Capital, Types of Share Capital, Accounting for issue, allotment of Shares and
Debentures,   Forfeiture of Shares and Issue of Bonus Shares.
Module-III   **Working Capital   :   (5 Hrs.)**
                        Estimation methods, determinants of Working Capital, Working Capital Financing.
Module-IV   **Preparation of Financial Statements : (10 Hrs.)**
                        Ratio Analysis (Liquidity, Leverage and profitability ratios)
                        Funds Flow and Cash Flow Analysis

Text Books
1.   Jain & Narang : Financial Accounting, Kalyani Publishers
2.   Maheswari, S.N. Manageemnt Accounting, Sultan Chand & Sons

Reference Books:
3.   Bhattacharjee & Dearden; Accounting for the Management Text & Cases, Vikas
4.   R. Narayanna : Financial Accounting, PHI
5.   A.Mukherjee, M. Hanif; Modern Accountancy; Tata McGraw Hill

PMC 3901 OPERATING SYSTEM LABORATORY

Shell programming, Sed, awk, grep
Process creation and execution, interprocess communication
Process signalling
File system mounting, disk organization
Semafor, creation and management of shared memory among processes

PMC 3902 RDBMS LABORATORY
(10 Classes for 10 Different Programs)

1.   Use of SQL syntax : Insertion, Deletion, Join), Updation using SQL. (1 class)
2.   Program segments in embedded SQL using C as host language to find average grade point of a student,
         etc.. (1 class)
3.   Program for Log based data recovery technique. (1 class)
4.   Program on data recovery using check point technique. (1 class)
5.   Concurrency control problem using lock operations. (1 class)
6.   Use of package (ORACLE) for programming approaches(2 classes)
7.   Use of package (DB2) for programming approaches(2 classes)
8.   Programs on JDBC/ODBC to print employee's / student's information of a particular department. (1
         class)

Semester 4

PCS 3004 SOFTWARE ENGINEERING & OOAD

Module I (10 hrs)
Introductory concepts : Introduction, definition, objectives, Life cycle - Requirements analysis and specification. Design and Analysis : Cohesion and coupling, Data flow oriented Design : Transform centered design, Transaction centered design. Analysis of specific systems like Inventory control, Reservation system.

Module II (10 hrs)
Object-oriented Design : Object modelling using UML, use case diagram, class diagram, interaction diagrams: sequence and collaboration diagrams, state-chart diagrams, activity diagram, unified development process.

Module III (12 hrs)
Implementing and Testing : Programming language characteristics, fundamentals, languages, classes, coding style efficiency. Testing : Objectives, black box and white box testing, various testing strategies, Art of debugging.
Maintenance, Reliability and Availability : Maintenance : Characteristics, controlling factors, maintenance tasks, side effects, preventive maintenance - Re Engineering - Reverse Engineering - configuration management - Maintenance tools and techniques. Reliability : Concepts, Errors, Faults, Repair and availability, reliability and availability models, Recent trends and developments.

Module IV (8 hrs):
Software quality: SEI CMM and ISO-9001. Software reliability and fault-tolerance, software project planning, monitoring, and control. Computer-aided software engineering (CASE), Component model of software development, Software reuse.

Text Book :
1.   Mall Rajib, Fundamentals of Software Engineering, PHI
2.   Pressman, Software Engineering Practitioner's Approach, TMH

PCS 3006 PROGRAMMING WITH JAVA

Module I (10 hrs)
Introduction to Java and Java programming environment.
Fundamental programming structures in java: Data Types. Variables. Assignments and Initializations. Operators. Strings. Control Flow. Arrays, comments.
Objects and Classes: Introduction to Object-Oriented Programming. Using Existing Classes. Building Your Own Classes. Static Fields and Methods. Method Parameters. Object Construction. Packages. Documentation Comments. Class Design Hints.
Multi-threading, Collections, Networking, database connectivity (JDBC), remote objects and remote object invocation.

Module II (10 hrs)
Inheritance: Extending Classes. Object: The Cosmic Superclass. The Class Class. Reflection. Design Hints for Inheritance.
Interfaces and Inner Classes: Interfaces. Object Cloning. Inner Classes. Proxies.
Graphics Programming: Introduction to Swing. Creating a Frame. Frame Positioning. Displaying Information in a Panel. 2D Shapes. Colors. Text and Fonts. Images.
Event Handling: Basics of Event Handling. The AWT Event Hierarchy. Semantic and Low-Level Events in the AWT. Low-Level Event Types. Actions. Multicasting. The Event Queue.

Module III (10 hrs)
User Interface Components with Swing: The Model-View-Controller Design Pattern. An Introduction to Layout Management. Text Input. Making Choices. Menus. Sophisticated Layout Management. Dialog Boxes.
Deploying Applets and Applications: Applet Basics. The Applet HTML Tags and Attributes. Multimedia. The Applet Context. JAR Files. Packaging Applications. Java Web Start. Storing Application Preferences.

Module IV (10 hrs)
Exceptions and Debugging: Dealing with Errors. Catching Exceptions. Some Tips on Using Exceptions. Logging. Assertions. Debugging Techniques. Using a Debugger.
Streams and Files: Streams. The Complete Stream Zoo. ZIP File Streams. Putting Streams to Use. Object Streams. File Management. New I/O. Regular Expressions.
Java beans , java security, internationalization

Text Books :
1.   Balguruswami, Programming with JAVA, TMH.
2.   Arnold Ken et al, The Java Programming Language, Pearson Education

PCS 3007 COMPUTER GRAPHICS

Module I (10 Hrs)
Graphics hardware and display devices graphics primitives- drawing lines and curves;
2d and 3d transformations; segments and their applications; generating curves, surfaces and volumes in 3d, wire-frame models, Bezier and spline curves and surfaces;
geometric modeling- elementary geometric algorithms for polygons, boundary representations, constructive solid geometry, spatial data structures; Hidden surface and line elimination; rendering- shading, light models, realistic image synthesis techniques, textures and image-based rendering; video games and computer animation.

Module II (10 Hrs)
Programming for generating lines, curves and rendered surfaces. Interactive graphics programming- modeling and updating objects in an object hierarchy, video games, computer animation and realistic image synthesis.
Programming environments: OpenGL (or equivalent), Java graphics environments, X windows (or equivalents).

Module III (10 Hrs)
Introduction to Multimedia System: Architecture and components, Multimedia distributed processing model, Synchronization, Orchestration and Quality of Service (QOS) architecture.
Audio and Speech: Data acquisition, Sampling and Quantization, Human Speech production mechanism, Digital model of speech production, Analysis and synthesis, Psycho-acoustics, low bit rate speech compression, MPEG audio compression.
Images and Video: Image acquisition and representation, Composite video signal NTSC, PAL and SECAM video standards, Bilevel Image Compression standards: ITU (formerly CCITT) Group III and IV standards, JPEC image compression standards, MPEG video compression standards.

Module IV (10 Hrs)
Multimedia Communication: Fundamentals of data communication and networking, Bandwidth requirements of different media, Real time constraints: Audio latency, Video data rate, multimedia over LAN and WAN, Multimedia conferencing.
Multimedia Information Systems: Operating system support for continuous media applications: limitations is usual OS, New OS support, Media stream protocol, file system support for continuous media, data models for multimedia and hypermedia information, content based retrieval of unstructured data.

Text Books :
1. Newman & Sproulle, Principles of Interactive Computer Graphics, TMH.
2. Roger & Adams, Mathematical Elements of Computer Graphics, TMH.

MGT 3004   HUMAN RESOURCE MANAGEMENT

Module-I   Introduction to Human Resource Management : (4 Hrs.)
Concept, Nature and Scope of Human Resource Management. Its growth and development in India. Role and functon of HR Manager.
Module-II   Human Resource base : (8 Hrs.)
Human Resource Planning , Concept & objectives, Job Analysis, Recruitment, Selection Procedure, Tests and interviews   Components of wages, criteria of wage fixation ,wage differentials.
Module-III   Training and Development : (8 Hrs.)
Training in Organization : its objectives, Process, Types of training programmes: Induction, On the job and Off the job training. Identification of Training Programmes. Evaluation of Training Programmes, Performance Appraisal.
Module-IV   Industrial Relations : (10 Hrs.)
Concept Values, Scope, Industrial Disputes : Concept, Forms, and Types Causes, Procedure for settlement of disputes in India. Workers participation in Management.

Text Books :
1.   Maamoria C.B. Personnel Management, Himalayan Publishing, New Delhi.
2.   Subba Rao P. Human Resource Management Texts and Cases.
Suggested Readings :
3.   Dessler Gary, Human Resource Management, PHI
4.   Rao, V. S. P., Human Resource Management, Excel Books
5.   Gerhat & Rynes, Compensation : Theory, Evidence and Strategic Implications, Response Books

PMC 3903 QUANTITATIVE TECHNIQUES - I

Module I (10 Hours)
Operations Research

Behavioural versus quantitative decision making, role of models. Linear programming, Graphical and simplex procedure, Sensitivity analysis; Transportation and Assignment problems, Application of linear programming in business and other systems, Integer linear programming, Cutting plane algorithm and branch and bound methods. Introduction to queuing, single and multiple server models, finite population models, queuing costs and applications.

Module II (10 hrs)

Probaibility & Statistics

Probability : Classical, relative frequency and axiomatic definitions of probability, addition rule and conditional probability, multiplication rule, total probability, Bayes' Theorem, and independence.
Random Variables : Discrete, continuous and mixed random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, moment generating function, Chebyshev's Inequality.
Module III (10 hrs)
Special Distributions : Discrete uniform, Binomial, Geometric, Poisson, Exponential, Gamma, Normal distributions ,Function of a Random Variable .
Joint Distributions : Joint, marginal and conditional distributions, product moments, correlation, independence of random variables, bivariate normal distribution.

Textbooks :
1.   Taha, Operation Research, PHI.
2.   Trivedi, Probability Statistics, PHI

PMC 3904 COMPUTER GRAPHICS LABORATORY

Drawing Lines, Curves,
Generating Curves, surfaces and volumes in 3d.
Spline curves and surfaces and line eliminations
Video Games and Computer Animation,
Java Graphics environments.

PSV 3001 PROGRAMMING WITH JAVA LABORATORY

Basic Java Programming (Application & Applet)

- Usage of constructors
- Usage of various Data Types
- Usage of Method overriding
- Usage of method over loading
- Incorporating the concepts of Inheritance
- Usage of string related operation
- Usage of Exception Handling
- Multi-Threaded Programming
- Programmes involving various methods of creating multi-threaded program
- Thread communications & signals
- Programmes involving Event Handling in AWT.
- Use of various Layout Managers
- Programming to carry out different types an I/O
- Graphics programming in AWT / swing
- Database programming in JAVA using JDBC

Semester 5

INTERNET TECHNOLOGY

Module-1: (10 hours)
Internet architecture :
Internet overview, evolution of internet.

Internet components - Local Area Networks, Access Networks, Core Networks, Routers, Transmission infrastructure, ISPs

Packet switching fundamentals-Packet Switching versus Circuit Switching. Connectionless packet switching (IP).

Internet Standards : Standards bodies and the standards process, IETF, ITU, IEEE, ATM Forum.

Module-2 : (10 hours)
Networking protocols
Network Protocol Overview : What are networking protocols, and what do they do ? Key protocol architectures.

IP Network Overview : What are the key IP network capabilities ? How will these capabilities adapt to future networks ? IP protocol operation.

IP addressing : IP address classes. Why are IP addresses under pressure, and what fixes are in place ?

TCP Fundamentals : How does TCP shield end users from IP network problems ? TCP protocol operation and capabilities. TCP/IP : routing.

Module - 3 : (10 hours)
Access Methods and Internet working :
Access Network Architectures : Access network characteristics. Differences between Access Networks, Local Area Networks and Wide Area Networks.

Access Technologies : Why there is an upper limit on modem speeds. Voice grade modems, ADSL, Cable Modems, Frame Relay.

DNS : Domain Names. Resolving Domain Names to IP addresses (DNS operation). Registering Domain Names and solving Domain Name disputes.

Routing : How the key IP routing protocols (OSPF and BGP4) operate. Implications of future Internet growth on routing protocol performance.

Module - 4 : (10 hours)
Internet applications :

FTP, Telnet, Email, Chat.

World Wide Web : HTTP protocol. Search Engines

E-Commerce and Security issues including symmetric and asymmetric key, encryption and digital signature, authentication.

Emerging trends, Internet telephony, virtual reality over the web, etc.

Intranet and extranet, firewall.

Text Book
1.   Data & Computer Communications, By William Stallings
2.   Computer Networks, A system approach By Larry L. Peterson, Bruce S. Davie
3.   Internetworking with TCP / IP, Principles, Protocols and Architecture, By Douglas E.Comer

QUANTITATIVE TECHNIQUES - II

System Modeling and Simulation.
Module - I : (10 hours)
Inventory Concepts : The technique of Simulation, Major application areas, concept of a System, Environment, Continuous and discrete systems, systems modeling types of models progress of a Simulation Study, Monte Carlo Method, Comparison of Simulation and Analytical Methods. Numerical Computation Technique for discrete and continuous models, Continuous System Simulation.

Module - II : (10 hours)
Probability Concepts in Simulation ; Stochastic variables, Discrete and Continuous Probability Functions, Numerical evaluation of continuous probability functions, continuous uniformaly distributed random numbers, Random Number Generators - Linear congruential Generator, Mid Square Method, Multiplicative Congruential generator, rejection Method, Testing of random Numbers, Generation of Stochastic variates, Arrival patterns Service times.

Module - III : (10 hours)
Discrete System Simulation and GPSS : Discrete Events, Representation of Time, generation of arrival patters, fixed time step versus next event simulation, Simulation of a Telephone System, delayed calls. Introduction to GPSS : Creating and moving transctions, queues, facilities and storages, gathering statistics, conditional transfers, program control statements, priorities and parameters, standard numerical attributes, functions, gates, logic switches and tests, Variables, Select and Count.

Module - IV : (10 hours)
Simulation Languages and Practical Systems : Continuous and discrete systems languages, factors in the selection of discrete system simulation language. Computer model of queueing, inventory and scheduling systems.
Design and Evaluation of simulation Experiments : Length of simulation runs, validation, variance reduction techniques, experimental layout, analysis of simulation output, Recent trends and developments.

Text Books :
1.	System Simulation - Geoffrey Gordon, 2nd edition, PHI
2.	System Simulation with digital computer - Narsingh Deo, PHI

Reference Book :

1.	Simulation, Modelling & Analysis - Averill M. Law & W. David Kelton, TMH
2.	Discrete Event System Simulation - Banks, John, S.Carson, Barry L. Nelson, David M. Nicol,
	PHI

COMPUTER NETWORKS

Module - I : (10 hours)
Overview of Data Communications and Networking
Physical Layer : Analog and Digital, Analog Signals, Digital Signals, Analog versus Digital, Data Rate Limits, Transmission Impairment, More about signals.
Digital Transmission : Line coding, Block coding, Sampling, Transmission mode.
Analog Transmission : Modulation of Digital Data; Telephone modems, modulation of Analog signals.
Multiplexing : FDM 150, WDM 155, TDM 157
Transmission Media : Guided Media, Unguided media (wireless)
Circuit switching and Telephone Network : Circuit switching, Telephone network.

Module-II : (10 hours)
Data Link Layer
Error Detection and correction : Type of Errors, Detection, Error Correction.
Data Link control and protocols :
Flow and error Control, Stop-and-wait ARQ. Go-Back. N ARQ, Selective Repeat ARQ, HDLC.
Point-to-Point Access : PPP
Point-to-Point Protocol, PPP Stack,
Multiple Access :
Random Access, Controlled Access, Channelizsation.
Local area Network : Ethernet
Traditional Ethernet, Fast Ethernet, Gigabit Ethernet
Wireless LANs : IEEE 802.11, Bluetooth virtual circuit : Frame Relay and ATM

Module - III : (10 hours)
Network Layer ; Host to Host Delivery : Internetworking, addressing and Routing
Network Layer Protocols : ARP, IPVA, ICMP, IPV6 ad ICMPR6
Transport Layer ; Process to process Delivery : UDP ; TCP congestion control and Quality of service.

Module - IV : (08 hours)
Application Layer :
Client Server Model, Socket Interface Domain Name System (DNS) :
Electronic Mail (SMTP) and file transfer (FTP) HTTP and WWW
Security :
Cryptography, Message security, User Authentication

Text Book :
Data Communications and Networking : Third Edition, Behrouz A. Forouzan
Tata Mc Graw-Hill Publishing Company Limited

Reference Book :
1.   Computer Networks : Third Edition, A system Approach, Larry L/Peterson and Bruce S.
        Davie ELSEVIER
2.   Computer Networks, A.S. Tannenbaum PHI

ENTERPRISE WEB-BASED COMPUTING WITH JAVA

Module - I   **10 hours**

Designing web pages : HTML, Forms, CGI Scripts and Clickable Maps

Module - II   **10 hours**

Designing web application : JAVA Applets, JAVA Scripts, JAVA servlets

Module - III   **10 hours**

JAVA Server pages, JAVA server faces, Struts, Perl, DHTML, XML
Web based application architecture : JSP model 1, MVC Architecture, Struts

Module - IV   **10 hours**

J2EE 1.3 including RMI, EJB, JDBC, SERVLETS, JNDI, JTA, JAAS, JMS, JAVA
Mail etc.

Text Book :
1.   Web Technologies - I & II by Ivan Byross
2.   Java Server Programming J2EE 1.3 Edition

ELECTIVE - I
COMPUTER SECURITY

Module - I : (10 hours)

The Security Problem in Computing :
The meaning of computer Security, Computer Criminals, Methods of Defense, Elementary Cryptography : Substitution Ciphers, Transpositions, Making "Good" Encryption Algorithms, The Data Encryption Standard, The AES Encryption Algorithm, Public Key Encryptions, Uses of Encryption.

Module - II : (10 hours)

Program Security :
Secure Programs, Nonmalicious Program Errors, viruses and other malicious code, Targeted Malicious code, controls Against Program Threats, Protection in General-Purpose operating system protected objects and methods of protection memory and addmens protection, File protection Mechanisms, User Authentication Designing Trusted O.S : Security polices, models of security, trusted O.S. design, Assurance in trusted OS. Implementation examples.

Module - III : (10 hours)

Data base Security :

Security requirements, Reliability and integrity, Sensitime data, Inference, multilevel database, proposals for multilevel security.

Security in Network :
Threats in Network, Network Security Controls, Firewalls, Intrusion Detection Systems, Secure E-mail.

Module - IV : (8 hours)

Administering Security :

Security Planning, Risk Analysis, Organizational Security policies, Physical Security. Legal Privacy and Ethical Issues in Computer Security :
Protecting Programs and data, Information and the law, Rights of Employees and Employers, Software failures, Computer Crime, Praia, Ethical issues in Computer Security, Case studies of Ethics.

Text Book :
Security in Computing Third Edition Charles P. Pfleeger, shari Lawrence Pfleeger. PHI

IMAGE PROCESSING

Module - I : (8 hours)

Digital Image Representation, Digital Image Processing System, Visual Perception, Sampling and Quantization, relatioship between Pixels, Fourier Transforms, Walsh, Hadamard and Discrete Cosine Transforms.

Module - II : (8 hours)

Spatial and Frequency domain methods, Enhancement by point Processing, Spatial Filtering, Enhancement in the Frequency Domain, Generation of Spatial Masks from Frequency Domain Specifications, Colour Image Processing.

Module - III : (8 hours)

Image Restoration
Degradation Model, Diagonalization of Circulant and Block Circulant of Matrices. Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filter, Constrained Least squares restoration, Iterative Restoration, Restoration in the Spatial Domain.

Detection of Discontinuity, Edge linking and Boundary Detection, Thresholding, Region-Oriented Segmentation, The use of Motion in Segmentation.

Text Books :

1.   Digital Image Processing, R.C. Gonzalez & R.E. Wood, Addison Wesley

Reference Book :

1.   Digital Image Processing and Analysis, B. Channda & D. Dutta, Prentice Hall
2.   Fundamentals of Digital Image Processing, Anil Ku Jain, PHI
3.   Fundamental of Electronic Image Processing, Arther R. Weeks Jr. PHI

ARTIFICIAL INTELLIGENCE

Module - I : (10 hours)
Introduction to Artificial Intelligence : The Foundations of Artificial Intelligence. The History of Artificial Intelligence, and The State Of The Art.
Intelligent Agents : Introduction, How Agents should Act, Structure of Intelligent Agents, Environments.
Solving Problems by Searching ; problem-Solving Agents, Formulating problems, Example problems, and searching for Solutions, Search Strategies, Avoiding Repeated States, and Contraint Satisfaction Search.
Informed Search Methods ; Best-First Search, Heuristic Functions, Memory Bounded Search, and Iterative Improvement Algorithms.

Module - II : (10 hours)
Agents That Reason Logically ; A Knowledge-Based Agent, The Wumpus World Environment, Representation, Reasoning & Logic prepositional Logic : A very simple Logic, An agent for The Wumpus World.
First-Order Logic ; Syntax and Semantics, Extensions and National, Variations, using First Order Logic, Logical Agents for The Wumpus World, A Simple Reflex Agent, Representing Charge in the World, Deducing Hidden Properties of the World, Preferences Among Actions, Toward A Goal-Based Agent.
Building a Knowledge Base ; Properties of Good and Bad Knowledge Bases, Knowledge Engineering. The Electronic Circuits Domain, General Outology, The Grocery Shopping World. Inference in First-Order Logic : Inference Rules Involving Quantifiers, An Example Proof. Generalized Modus Ponens, Forward and Backward, Chaining & Completeness, Resolution : A complete Inference Procedure, Completeness of Resolution.

Module - III :   (10 hours)
Planning : A Simple Planning Agent Form Problem Solving to Planning. Planning in Situation Calculus. Basic Representations for Planning. A partial-Order planning Example, A partial Order planning Algorithm, Planning With partially Instantiated Operators, Knowledge Engineering for Planning.
Making Simple Decision : Combining Beliefs and desires under uncertainty. The Basis of Utility Theory, Utility Functions. Multi attribute utility Functions, Decision Networks. The Value of Information. Decision - Theoretic Expert Systems.
Learning in Neural and Belief Networks' How the Brain Works, Neural Networks, perceptions, Multi-layered Feed Forward Networks Applications Back propagation algorithm Applications of Neural Networks.

Module - IV : (10 hours)
Knowledge in Learning ; Knowledge in Learning, Explanation-based Learning, Learning Using Relevance Information, Inductive Logic programming
Agents That Communicate ; Communication as action, Types of Communicating Agents, A Formal Grammar for A subset of English Syntactic Analysis (Parsing), Definite Clause Grammar (DCG), Augmenting A Grammar. Semantic Interpretation. Ambiguity and Disambiguation. A Communicating Agent.
Practical Natural Language processing Practical applications. Efficient Parsing Scaling up the lexicon. Scaling up the Grammar Ambiguity. Discourse Understanding.

Text Book :
Ressell S J & Norvig p, Artificial Intelligence ; A modern Approach (ISBN 0-131-038-052) Prentice-Hall Inc, 2002.

Reference Book :

1.   Winston PH, Artificial Intelligence (3rd Edition) (ISBN 0-070-522-634) McGraw Hill 1991.

PARALLEL COMPUTING

Module - 1 : (10 hours)

Introduction to Parallel Computing ; Motivating Parallelism, Scope of Parallel Computing. Parallel Programming Platforms : Implicit parallelism, Limitation of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs of Parallel Machines, Routing Mechanism for Interconnection Networks, Impact of Process-processor Mapping and Mapping Techniques.

Module - II : (10 hours)

Principles of Parallel Algorithm Design : Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for containing interaction Overheads, parallel Algorithm Models.

Analytical Modelling of Parallel Programs : Sources of Overhead in Parallel Programs, Performance metrics for parallel systems, the effect of Granularity on Performance, Scalability of Parallel Systems, minimum Executuion time and minimum cost-optional Execution Time, Asymptotic Analysis of Parallel Programs, other Scalability Metrics.

Module - III : (10 hours)

Basic Communication Operations : One-to-All Broadcast and All-to-One Reduction, All-to-All Broadcast and Reduction, Scatter and Gather, All-to-All Personalized Communication, Circular Shift.
Introduction to MPI P Principles of Message - Passing Programming, The Building Blocks (Send and Receive Operations), MPI (the Message Passing Interface), Collective Communication and Computation Operations, Examples of Matrix - Matrix multiplication, One dimensional Matrix Vector Multiplication using MPI.

Module - 4 :(10 hours)

Matrix Vector Multiplication, matrix - matrix multiplication (a simple parallel Algorithm, Cannon's Algorithm), A simple Gaussian Elimination Algorithm, Solving a Triangular System (Back Substitution)

Issues in Sorting on Parallel Computers, Odd-Even Transposition, Quicksort.

Text Book :

Introduction to Parallel Computing (2nd Edition) by Ananth Gramma, lAnshul Gupta, George Karypis & Vipin Kumar [Pearson]

LAB – IX

ENTERPRISE WEB BASED COMPUTING WITH JAVA

1.   Web page designing using HTML (Table, Forms, Frameset, clickable map, images, list etc) DHTML.

2.   Client side scripting through Java script (simple script, Java scsript object, Model working with properties and methods, event handling, Form validation etc.)

3.   Server side scripting through Perl, lServlet, JSP (Simple Server Side Programming)
4.

LAB – X

NETWORK PROGRAMMING USING SOCKET (C / JAVA)

1.   Connection oriented socket (TCP)
2.   Connection less socket (UDP)
3.   Socket system calls

bind ()   send ()
listen ()   send to ()   recv ()   recvform ()
accept () etc

Examples :

Echo server & client using TCP & UDP
Connect Server client using TCP & UDP
Literative Server client using TCP & UDP
File transfer client using TCP & UDP

Semester 6

INDUSTRY EXPERIENCE AND PROJECT WORK

To be carried out in an Industry. There will be one assessment of the project conducted jointly by the Supervisor from the Industry and the supervisor from the college for 4 credits. Final evaluation of 16 credits will be done as per Section 4.9 of the Academic regulation.