

DEPARTMENT OF INFORMATION TECHNOLOGY

Babasaheb Bhimrao Ambedkar University, Lucknow

Curriculum of M. Sc. In Information Technology

Total Credit of the Course = 96

1st SEMESTER

Total Credit= 24

S. No.	Paper Code	SUBJECT	CREDIT
1	MIT101	Introduction to Information Technology	4
2	MIT102	Data Structure and Algorithm	6
3	MIT103	Digital Communication & Computer Networks	6
4	MIT104	Computer Architecture	4
5	MIT105	<ul style="list-style-type: none">• Programming in C & C++• Programming Languages & Concepts• Object Oriented Concepts	4

2nd SEMESTER

Total Credit= 24

S. No.	Paper Code	SUBJECT	CREDIT
1	MIT201	Network Security	4
2	MIT202	Operating System & Systems Programming	6
3	MIT203	Data Base & Data Warehousing	6
4	MIT204	Software Engineering	6
5	MIT205	<ul style="list-style-type: none">• JAVA Programming,• Window Programming• VC++	2

3rd SEMESTER

Total Credit= 24

S. No.	Paper Code	SUBJECT	CREDIT
1	MIT301	Computer Graphics	4
2	MIT302	Software Testing & Quality Assurance	6
3	MIT303	Selected Topics in Information Technology	6
4	MIT304	<ul style="list-style-type: none">• Web Technology• Advance Software Engineering• Dot NET Technology	4
5	MIT305	Educational Tour, Industrial Visit/ Minor Project	4

4th SEMESTER

Total Credit= 24

S. No.	PARER CODE	SUBJECT	CREDIT
1	MIT401	Dissertation & Comprehensive Viva	24

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DETAILED SYLLABUS- M. SC. (IT)

MIT101-INTRODUCTION TO INFORMATION TECHNOLOGY

- UNIT-1 FUNDAMENTAL CONCEPT OF INFORMATION**
Definition of information, Data Vs Information, Introduction to Information representation in Digital Media, Text, image, graphics, Animation, Audio, Video etc., Need, Value and Quality of information, Concept of Information Entropy. MPEG, RTF, TIFF JPEG, MPEG.
- Unit-2 CONCEPTS IN COMPUTER & PROGRAMMING**
Definition of Computer, History, Generations, Characteristic and Application of Computers, Classification of Computers, RAM/ROM, Computer Hardware, CPU, Various I/O devices, Peripherals, Storage Media, Role and Categories. Computer Languages, Generation of Languages, Translators-Interpreters, Compiler/Interpreters, Compilers, Flow, Charts, Dataflow Diagram, Assemblers, Introduction to 4GLs, Software Development Methodology, Life Cycles.
- UNIT-3 DIGITAL DEVICES AND BASIC NETWORK CONCEPTS**
Decimal, binary, hexa decimal conversion, floating numbers, gates, flip flops, adder, multiplexes, need for Data Transmission over distances, Types of Data Transmission, Media for Data Transmission, AM, FM, Digital Modulation, Concepts in Computer Networks, Networking of computers- Introduction of LAN & WAN. Network Topologies.
- UNIT-4 INTERNET AND WEB TECHNOLOGIES**
Hypertext Markup Language, DHTML, WWW, Gopher, FTP, Telnet, Web Browsers, Net Surfing, Search Engines, Email, ISP, EDI, E-Commerce, Public Key Private Key, Safety of Business Transaction on web. Elementary Concepts of E-Commerce, Electronic Token, Security Threats, Electronic Payment Systems, Digital Signatures, Network, Security, Firewall, Introduction to Web Technologies.
- UNIT-5 CONCEPTS IN OPERATING SYSTEM & DATA MANAGEMENT**
Elementary Concepts in Operating System, textual Vs GUI Interface, Introduction to DOS, MS Windows, MS office Tools, MS WORD, MS EXCEL, MS Power Point, Basics of Database management system, Introduction to basic Commands of Dbase, SQL Etc.

TEXT BOOK(S)

1. D S Yadav, “**Foundations of IT**”, New Age, Delhi

REFERENCE BOOKS

1. Curtin, “**Information Technology : Breaking News**”, TMH
2. Rajaraman, “**Introduction to Computers**”, PHI
3. Peter Nortans “**Introduction to Computers**”, TMH.
4. Leon & leon “**Fundamental of information Technology**”, Vikas

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MIT102-DATA STRUCTURE & ALGORITHM

UNIT-1 REVIEW OF C++

Object oriented programming, concepts of OOP, advantages of OOP, C++ program structures classes, objects, friend functions, overloading member functions, constructors, destructors, operator overloading and type conversion, inheritance, virtual base classes, abstract classes, inheritance, arrays, memory models, new and delete operators binding, polymorphism and virtual functions, exceptional handling, strings.

UNIT -2 RECURSION AND POINTERS

Factorial, surface analysis of recursion; Recursion as a natural means of expressing algorithms for solving certain kinds of problems- Arithmetic expression evaluation, Towers of Hanoi; Backtracking techniques, Applications-Polish notation, Infix to Polish conversion, Polish conversion to code. Introduction to pointers.

UNIT -3 DYNAMIC DATA STRUCTURES, STACK, QUEUES & LINKED LIST

Dynamic data / dynamic memory -- allocation and de-allocation; Class constructors (default constructors; copy constructors); Dynamically sized arrays - collections of varying sizes, Stack definition, basic stack operations, stack linked list implementation, queue definition, queue operations, queue linked list design, Linked lists: Traversals – search, Insertion / deletion; Doubly linked lists, Circularly linked lists.

UNIT –4 SEARCHING, SORTING AND TREES

Searching algorithms, Algorithm analysis for best, worst, and average cases, sorts: selection and insertion, sorts: Shell sort, heap sort, and quick sort, Trees: Binary search trees, Binary tree traversal, Binary expression trees. AVL Tree, B Tree, B+ Tree.

UNIT –5 GRAPHS

Graphs, graph operations, graph storage structures, graph algorithms.

TEXT BOOKS

1. Gottfried, “**Schaum’s Outline series in C Programming**”, McGraw Hill.
2. Horowitz, E. and Sahni, S., “**Fundamentals of Data Structures**”, Galgotia Publications. 2002

REFERENCE BOOKS

1. Kernighan and Ritchie, “**The C programming Language**”, PHI. 1999
2. Lipschultz, “**Schaum’s Outline series in Data Structures**”, McGraw Hill.
3. Hutchison, R., “**Programming in C**”, McGraw Hill. 1999.
4. Johnsonbaugh,R.and Kalin M.,“**Applications programming in C**”,PHI.
5. Rajaraman, V., “**Computer programming in C**”, PHI. 2003

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MIT103- DIGITAL COMMUNICATION AND COMPUTER NETWORKS

UNIT-1 INTRODUCTION TO DIGITAL COMMUNICATION

Introduction to digital communication, analog Vs Digital Communication, Fourier Analysis, Band Width limitation, data rate of a channel, Error detection and correction; nature of errors, parity check, CRC, hamming code, Modulation; Multiplexing: SDM, FDM, TDM, STDM.

UNIT-2 INTRODUCTION TO NETWORK

Introduction to computer networks and application; network hardware, network software, OSI reference model, TCP/IP model, network standardization, physical layer: circuit switching, packet switching, message switching, terminal handling, telephone system, modems, connections, transmission media- Guided media and unguided media.

UNIT-3 PHYSICAL & DATA LINK LAYER

Duties of Physical Layer; Signals - Transmission impairment; Transmission Mode - Serial and Parallel transmission; Analog Transmission - Telephone Modems; Transmission media -; Circuit switching and telephone network, Duties of DLL; Error detection and correction; Data link control and protocols; Multiple access – Random access and Controlled access; Local Area Networks - Ethernet; Connecting devices; Virtual Circuit switching – Frame Relay & ATM

UNIT-4 NETWORK AND TRANSPORT LAYER

Host-to-Host Delivery – Internetworks, Addressing and Routing; Network layer protocols – ARP, IPv4, ICMP and IPv6; Unicast routing – RIP and OSPF; Multicast routing – IGMP; Duties of Transport layer; Process- to-process delivery- UDP, TCP.

UNIT-5 APPLICATION LAYER

Application layer - Issues, DNS, E-mail and FTP; HTTP and WWW; Security – Cryptography

TEXT BOOK(S)

1. Behrouz A Forouzan, “**Data communication and networking**” Tata McGraw Hill – 2004.

REFERENCE BOOKS

1. Andrew S. Tanenbaum, “**Computer Networks**” PHI – 2003
2. William Stallings, “**Data and computer communications**” PHI 1997

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MIT104 -COMPUTER ARCHITECTURE

UNIT-1 INSTRUCTION SET DESIGN

Alternatives and Principles: classifying instruction set architectures, operations in the instruction set, type and size of operands, instruction representations, interactions between languages and instruction sets, measuring instruction set usage, instruction set examples.

UNIT-2 ARITHMETIC LOGIC UNIT & BASIC PROCESSOR IMPLEMENTATION TECHNIQUES

Arithmetic and logic operations, arithmetic and logic operands, constructing an arithmetic logic unit. processor data path, basic steps of execution, hardwired control, Interrupts.

UNIT-3 PIPELINING

Pipelined datapaths, pipelined control, pipeline hazards, pipeline implementations, Dynamic instruction scheduling , taking advantage of more instruction-level parallelism, Branch prediction

UNIT-4 MEMORY SYSTEMS

Principle of locality, principles of memory hierarchy, caches design and optimization, main memory, virtual memory design, memory protection, memory coherency, evaluating memory hierarchy performance

UNIT-5 I/O & MULTIPROCESSORS

I/O interface. Buses, Multiprocessor organizations. Cache coherence, Types and uses of storage devices, interfacing I/O to the rest of the system, reliability and availability, I/O system design, classifying parallel architectures, centralized vs. distributed shared memory, interconnection topologies, synchronization, memory consistency

TEXT BOOK(S)

1. D. Patterson and J. Hennessy, **Computer Organization and Design: The Hardware/Software Interface**, Third Edition.

REFERENCE BOOKS

- 1 J. Hennessy and D. Patterson, **Computer Architecture: A Quantitative Approach (3rd Edition)**, Morgan Kaufmann Publishers, 2003.
2. Mark Hill, et al, **Readings in Computer Architecture**, Morgan Kaufmann Publishers.
3. Kai Hwang, **Advanced Computer Architecture**, McGraw Hill, 1993.

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MIT-201 NETWORK SECURITY

- UNIT-1 FOUNDATIONS OF INFORMATION SECURITY**
Threats & Countermeasures, Terminology: Security Objectives and Services, Cryptographic Algorithms and Protocols, Cryptography and Cryptanalysis, Primitives: Symmetric Encryption, Asymmetric Encryption / Signing, Modification Check Values, Random Number Generation, Cryptographic Protocols, Access Control
- UNIT-2 NETWORK SECURITY INTEGRATION AND LINK LAYER SECURITY PROTOCOLS**
Basic Design Space of Security Integration, Pragmatic Internet Computing Model and Different Security Requirement Levels, Discussion of Integration into Lower vs. Higher Protocol Layers and into End Systems vs. Intermediate Systems, Link Layer Security Protocols: Point to Point Protocol, Point to Point Tunneling Protocol, Layer 2 Tunneling Protocol, Virtual Private Networks: Definition and Design Alternatives
- UNIT-3 INTERNET SECURITY ARCHITECTURE**
Basic Security Deficits of the Internet Protocol, Security Objectives of IPSec, Overview on Concepts: Security Associations, Security Association Database, Security Policy Database, Security Protocols, Transport Mode and Tunnel Mode, Authentication Header (AH), Encapsulating Security Payload (ESP), Authentication and Key Management
- UNIT-4 TRANSPORT LAYER SECURITY PROTOCOLS AND FIREWALLS**
Secure Socket Layer / Transport Layer Security (SSL/TLS), Secure Shell (SSH), Basic Firewall Concepts, Firewall Architectures, Packet Filtering, Proxy Services and Bastion Hosts
- UNIT-5 SECURITY IN WIRELESS AND MOBILE NETWORKS**
Specific Threats in Mobile Communications, Security of Wireless Local Area Networks according to IEEE 802.11, GSM/GPRS/UMTS Security Concepts and Protocols, Outlook on Security for Mobile Internet Communications, Electronic Payment Systems, Secure Electronic Transaction (SET), CyberCash, iKey Protocols, Ecash (DigiCash)

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MIT202-OPERATING SYSTEM & SYSTEMS PROGRAMMING

UNIT-1 INTRODUCTION TO OPERATING SYSTEM

Introduction-What is an OS-OS structures-Process management-Process concept-Process creation-Operation on processes-Inter process communication

UNIT-2 MEMORY MANAGEMENT

Storage management - Memory management - Logical Vs Physical address space - Swapping – Contiguous allocation – Paging – Segmentation - Virtual memory - Demand paging - Page replacement - Page replacement algorithms – Thrashing

UNIT-3 FILE SYSTEM & DEADLOCKS

File system interface-file concept-access methods-directory structure, Process Synchronization, Deadlocks - Deadlock characterization – Preventions - Deadlock avoidance. Detection recovery from Deadlock

UNIT-4 ASSEMBLER AND MACROS

Assemblers: - Two pass and one pass assemblers. Macros:- Macro definition, macro call, macro expansion, nested macro calls, macro processors.

UNIT-5 COMPILER

The phases of a compiler, the role of the lexical analyzer, a simple approach to the lexical analysis- transition diagram. The syntactic specification of a programming language- Context free grammar derivations and parse tree, unambiguous grammar. Basic parsing techniques- bottom-up and top-down parses, representation of a parse tree,

TEXT BOOKS

1. D. M. Dhamdhare, **System Programming & Operating Systems**, Tata McGraw Hill, 1993 (Reprinted 1994, 1995).
2. Silberschatz Galvin et. al.– **“Operating system concepts”** - John Wiley & Sons – 2004

REFERENCE BOOKS

1. Milan Milenkovic – **“Operating System Concepts and Design”** - McGraw Hill – 2003
2. Andrew S. Tannenbaum – **“Modern Operating System”** – PHI – 1997.
3. Deital - **“An Introduction to Operating System”** – Pearson Education–1990

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MIT203- DATA BASE AND DATA WAREHOUSING

UNIT-1 INTRODUCTION

Purpose of Database system - Advantages of DBMS over File Processing System – View of Data - Data Abstraction - Data Independence – Data models – Database languages – Database Administrator – Database users – DBMS system structure

UNIT-2 LOGICAL DATABASE DESIGN

ER model basic concepts – Attributes and its types – Entity and Entity set – Relationship & Relationship set - Mapping Constraints – Keys – ER Diagram – Weak entity sets

UNIT-3 RELATIONAL, OBJECT MODEL & DESIGN TECHNIQUES

Structure of Relational Database - Relational Algebra - Extended Operations - Tuple relational Calculus & Domain Relational Calculus – Aggregate Functions- Modification of the database-Views – Object Oriented Database - Object Relational Database, Pitfalls in relational database design- Decomposition - 1 NF, 2 NF, 3 NF, BCNF, 4 NF & 5 NF.

UNIT-4 PHYSICAL IMPLEMENTATION, TRANSACTION & RECOVERY

Storage and File Structure, Indexing & Hashing, Transaction Concurrency Control, Recovery System, Parallel & Distributed Database.

UNIT-5 DATA WAREHOUSE CONCEPTS AND TERMINOLOGY

Data Warehouse Definition, Data Warehouse Properties, Data Warehousing Terminology, Components of a Data Warehouse, Oracle Warehouse Vision, Products, and Services, Online Analytical Processing (OLAP).

TEXT BOOK(S)

1. Ramez Elmasri and Shamkant B. Navathe, “**Fundamentals of Database Systems**”, Fourth Edition, Pearson Addison Wesley;

REFERENCE BOOKS

- 1 Peter Rob and Carlos Coronel, Thomson Learning, “**Database Systems Design, Implementation and Management**”, 5th edition, Course Technology,
2. “**Modern Database Management (6th Edition)**”, Prentice Hall.
3. Jeffrey A. Hoffer, Mary B. Prescott, and Fred R. McFadden, “**Database Systems, A Practical Approach to Design, Implementation, and Management**”, Thomas M. Connolly and Caroline E. Begg, Addison-Wesley.

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MIT204- SOFTWARE ENGINEERING

UNIT-1 SOFTWAREENGINEERING PARADIGMS

Software Characteristics – Software myths – Software Applications - Software Engineering Definitions – Layered Technology – Software Process – Introduction to CMM and Umbrella Activities – Various Software Process Models, Overview of Quality Standards like ISO 9001, SEI-CMM

UNIT-2 PROJECT PLANNING AND SCHEDULING

Software Project Management Spectrum – Team Organization – Software Metrics and Measures – Process Metrics –Project metrics - Software Project Planning – Empirical-Putnam, COCOMO – Risk Identification and Projection – RMMM – Project Scheduling and Tracking.

UNIT-3 ANALYSIS AND DESIGN

System Engineering - Requirement Analysis – Analysis Concept and Principles -Analysis Modeling – Software Design concepts and Principles – Effective modular design

UNIT-4 SCM AND SOFTWARE RELIABILITY

SCM – SCI – Change control, Version control – Configuration Audit - Software Re-engineering – Benefits and Activities – Forward and Reverse Engineering, Reverse Engineering, Software Re-engineering, Software Reliability Engineering – Software Reliability Metrics – MTTF, MTBF, POFOF, ROCOF, Software Reliability, Mistake Proofing for Software.

UNIT-5 SOFTWARE TESTING AND MAINTENANCE

Software Testing Objectives and Principles – Testing Techniques – Testing strategies – Debugging Principles – Testing for specialized environments, Management of Maintenance, Maintenance Process, Maintenance Models.

TEXT BOOK(S)

1. Roger S. Pressman – “**Software Engineering: A Practitioner Approach**” - McGraw Hill – 6TH Edition 2005.

REFERENCE BOOKS

1. Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli – “**Fundamentals of Software Engineering** - Prentice Hall of India
2. Farley – “**Software Engineering Concepts**” - McGraw Hill
3. Sommerville I. – “**Software Engineering**” - Addison Wesley

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MIT301- COMPUTER GRAPHICS

- UNIT-1 OVERVIEW OF COMPUTER GRAPHICS AND DISPLAY DEVICES**
Interactive Graphics, Passive Graphics, Refresh CRT, Random-Scan and Raster Scan Monitor, Vector, Inner Product and vector product, Distance between a point and a line, Projection of a point on line, scan conversion of Line, Circle, and ellipse.
- UNIT-2 2-D GRAPHICS TRANSFORMATIONS**
Geometric and Co-Ordinate Transformation- Rotation, Scaling, and Reflection.
- UNIT-3 2-D VIEWING AND CLIPPING**
Windowing concept, Clipping algorithms(line, Sutherland, mid-point subdivision), window to viewport transformation, Be'zier curves, B-Spline curve fitting.
- UNIT-4 3-D GRAPHICS & PROBLEM OF PROJECTION**
3-D Graphics Transformations- - Rotation, Scaling, and Reflection, Parallel projection, perspective projection, Z-Buffer Algorithm.
- UNIT-5 HIDDEN SURFACE ELIMINATION**
Hidden Line Surface Removal Algorithms, Z-Buffer, Scan Line, Sub Division Shading: Modeling Light Intensities: Diffuse Reflection, Refracted Light, Half toning, Surface Shading Methods: Constant Intensity Method, Gouraud Shading, Phong Shading.

TEXT BOOK(S)

1. D.P. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI, 2002.

REFERENCE BOOKS

1. David Hillman, "Multimedia Technology & Applications", Galgotia Publications.
2. Rajneesh Agrawal, "Multimedia Systems", Excel Books.
3. Nigel Chapman & Jenny Chapman, "Digital Multimedia", Wiley Publications.

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MIT302 -SOFTWARE TESTING AND QUALITY ASSURANCE

UNIT-1 SOFTWARE TESTING FUNDAMENTALS

Introduction; Software Testing Perspective Related Terminology; Myths; Purpose, Goal and Objectives; Challenges and Issues; Effective Software Testing; Types of Testing; Principles of Software Testing; Testing and Debugging, Testability Artifacts Testability Facilitators, Testability Analysis

UNIT-2 STATIC TESTING & TESTING STRATEGY

Introduction, Principles of Static Analysis, Static Testing Perspective, General Methodology, A Taxonomy of Static Testing, Manual Techniques, Walkthrough, Formal Reviews, Inspection, Automated Testing, Syntax Parser, Static Verification, Symbolic Execution, Static Vs Dynamic Testing, Strategic Issues Strategic Premises A Generic Testing Strategy Models for Software Testing

UNIT-3 BLACK BOX TESTING & WHITE BOX TESTING

Introduction, Black Box Techniques, Equivalence Partitioning, Scope and Prospects, Test Case Generation, Boundary Value Analysis, Robustness Testing, Syntax Testing, Finite State Testing White Box Technique White Box Modeling Basis Path Testing Control Structure Testing Mutation Testing

UNIT-4 SOFTWARE AND QUALITY CONCEPT

Objectives, Quality: An Overview, Software Perspective, Software Quality Factors& Planning Software Quality Assurance, Software Quality Models, Software Quality Measurement and Metrics, Software Quality Assurance Software Quality Assurance Life Cycle Establishing Software Quality Assurance Program SQA Activities

UNIT-5 SQA PLANNING & STANDARDS

Building Blocks of Software Quality Assurance Plan, SQA Planning Assurance, Journey of Standards SQA Standards: Purpose and Role SQA Standards: Requirements and Activities ISO 9000 Quality Standard Series
Software Metrics, Software Quality Metrics Framework, Software Quality Metrics Features, Developments of Software Quality Metrics, Selection of Software Quality Metrics, Quality Models: Hierarchical Models Quality Models: Non- Hierarchical Models, Capability Maturity Models, CMM Maturity Levels

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MIT-304 WEB TECHNOLOGY

UNIT – 1 INTRODUCTION

Introduction and overview of Internet & Web; Web Design: Key issues in web site design, Introduction to HTML, Structure of a Web Page, Various HTML Tags, Table Handling, Frames, Forms & Interactivity;

UNIT –2 DESIGN TOOLS

Usage of various web based tools like Microsoft Front page, Adobe Photoshop, Ulead Gif Animator, Macromedia Flash etc.; Various Security methods like firewalls etc.

UNIT – 3 E-COMMERCE

Types of E-Commerce applications, Architectural Framework & Order Management Cycle of E-Commerce, Components and public issues of i-way , media convergence, challenge response system, Electronic Market place, types of electronic payment systems and electronic tokens, challenges in electronic payment systems, Mercantile process and Mercantile consumer Models;

UNIT-4 M-COMMERCE

WAP features and applications, WAP Architecture & Workability, WML skeleton framework.

UNIT – 5 WEB TECHNOLOGIES

Brief Overview & usage of various web technologies. ASP Application Development Framework - ASP request object, ASP response object, ASP server object, ASP session object, ASP components, Creating interactive applications using active server pages. JAVA: Embedding java applets and java script in web page. .NET technology & C# - Overview

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Electives

ARTIFICIAL INTELLIGENCE

UNIT –1 INTRODUCTION

Introduction to Artificial Intelligence, Simulation of sophisticated & Intelligent Behavior in different area problem solving in games, natural language, automated reasoning, visual perception.

UNIT-2 STATE SPACES, PRODUCTION SYSTEMS AND SEARCH

State Space representation of problems. Problem solving as search. Constraints. Definition and examples of Production Systems. Heuristic search techniques. Two person games.

UNIT-3 KNOWLEDGE REPRESENTATION

First order predicate calculus, Horn Clauses, Introduction to PROLOG, Partitioned Nets, Minsky frames, Case Grammar Theory, Production Rules Knowledge Base, The Interface System, Forward & Backward Deduction.

UNIT-4 WEAK SLOT AND FILLER STRUCTURES

Semantic Nets and Frames. Scripts for representing prototypical combinations of events and actions, Pattern-matching algorithms. The problem of Control in Rule Based Systems. The Rete Algorithm

UNIT-5 PATTERN RECOGNITION

Introduction to Pattern Recognition, Structured Description, Symbolic Description, Machine perception, Line Finding, Interception Semantic & Model, Object Identification, Speech Recognition.

TEXT BOOK(S)

1. Elaine Rich and Kevin Knight, **Artificial Intelligence**, Mc Graw Hill, 2nd Edition, 1991.

REFERENCE BOOKS

1. Stuart Russell and Peter Norvig, **Artificial Intelligence: A Modern Approach**, Prentice Hall, 2nd edition, 2003.
2. Herbert A. Simon, **The Sciences of the Artificial**, MIT Press, 3rd Edition (2nd printing), 1998.
3. Guy Steele, **Common Lisp: The Language**, Digital Press, 2nd Edition, 1990.

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MICROPROCESSOR BASED SYSTEM DESIGN

- UNIT-1 ARCHITECTURE**
Review of Z80, the instruction cycle, registers and stacks etc., external interface; introduction to 8086 series; register architecture, external interface
- UNIT-2 80X86 PROGRAMMING**
Addressing modes, branching and conditions; stack commands; subroutines, port I/O, interrupts; Internal Operation of the Processor: register transfer logic, instruction formats; microcode, timing diagrams; design techniques: pipelining etc.
- UNIT-3 SYSTEMS DESIGN**
Memory: Static/Dynamic RAM, technology and timing; ROM, PROMs, EPROMs, PLAs, DMC chips address decoding, EDAC;
- UNIT-4 INPUT/OUTPUT**
Parallel, serial I/O, DMA; interrupts and interrupt control circuits; Microcomputer Buses: the system bus, bus interface and arbitration circuits; bus standards
- UNIT-5 PERIPHERALS**
Keyboards, CRT controllers, printers; secondary memory; A/D and D/A Conversions; Engineering: noise, reliability etc. Putting a System Together: the development cycle (h/w and s/w), development aids; cost of development and production

DIGITAL IMAGE PROCESSING

- UNIT-1 INTRODUCTION TO THE DIGITAL IMAGE**
Why digital images; The digital camera; Data types and 2d representation of digital images; Discrete sampling model; Quantisation; Noise processes; Image attributes
- UNIT-2 SEGMENTATION & IMAGE TRANSFORMATIONS**
Thresholding and thresholding algorithms; Performance evaluation and ROC analysis; Connected components labeling; Region growing and region adjacency graph (RAG); Split and merge algorithms; Grey level transformations; Histogram equalization; Geometric transformations; Affine transformations; Polynomial warps
- UNIT-3: MORPHOLOGICAL OPERATION & FEATURE CHARACTERISATION**
Erode and dilate as max and min operators on binary images; Open, close, thinning and other transforms; Medial axis transform; Introduction to grey-level morphology; Calculation of region properties; Moment features; Boundary coding; Fourier descriptors
Line descriptors from boundary coding and from moments
- UNIT-4 IMAGE FILTERING & EDGE DETECTION**
Linear and non-linear filtering operations; Image convolutions; Separable convolutions
Sub-sampling and interpolation as convolution operations; Alternative approaches; Edge

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enhancement by differentiation; Effect of noise, edge detection and Canny; implementation; Edge detector performance evaluation

UNIT-5 CORNER DETECTION & COLOUR IMAGES

Image structure tensor; Relationship to image auto-correlation; Characterisation and Harris corner detector; Sub-pixel accuracy and performance evaluation; Representations of colour in digital images; Colour metrics; Pixel-wise (point) operations; Colour invariants and Finlayson colour constancy algorithm Similarity and dissimilarity matching metrics; L2 metric and relationship to cross-correlation; Image search and multi-resolution algorithms; 2D object detection, recognition, location

ADVANCE JAVA PROGRAMMING

UNIT-1 JAVA SERVLET

Servlet life cycle , servlet basics , HTTP servlets, The Servlets API, request server side – , session tracking , databases and non-HTML content , request dispatching , shared attributes, resource abstraction. advantages of Servlets over CGI; Servlet sessions; Servlet class hierarchy; Servlet interaction with the client

UNIT-2 JDBC

JDBC versus ODBC; JDBC driver types; JDBC-ODBC bridge; two tier versus three tier models; Java Database Connectivity: JDBC overview , Architecture , Drivers, database connection statements Result sets, transaction, Metadata and Aggregate functions , callable statements.

UNIT-3 JAVA NETWORKING

Remote Method –introduction , architecture, defining remote objects, creating stubs and skeleton, object serialization, dynamically loaded classes, RMI activation, registering remote objects, marshaled objects. CORBA-concepts, object bus, distributed objects, interoperability of distributed objects, concept of open object bus, a java interface to CORBA, creating a basic CORBA server, creating CORBA clients with Java IDL, RMI v/s CORBA

UNIT-4 JAVA BEAN

Basics of designing JavaBeans, creating and using properties, using events to communicate with other components, Enterprise Java Beans- basics of EJB, implementing session beans , implementing Entity Beans , Deploying an Enterprise Java Beans.

UNIT-5 REVIEW OF OTHER JAVA TECHNOLOGIES

JSP(Java Server Pages: Introduction to JSP, Use of JSP, JSP Architecture, JSP tags, Implicit and Explicit objects, Request forward, Request –time include ,use of Beans in JSP and their scopes. Java Naming and Directory Interface (JNDI); Java Transaction Service (JTS); Java Message Service (JMS); Java in small memory spaces, eg PDAs

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SOFT COMPUTING

UNIT – 1 INTRODUCTION

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, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

UNIT – 2 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.

UNIT – 3 FUZZY ARITHMETIC

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges. Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

UNIT-4 FUZZY IMAGE PROCESSING

Introduction to fuzzy image processing, Fuzzy Data Fusion; Fuzzy Diagnosis; Neural Networks: Supervised Learning: Hopfield Nets, Perceptrons, gradient descent, multilayer nets, backpropagation, overfitting.

UNIT – 5 NEURO-FUZZY SYSTEMS

Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks. Application of Fuzzy Logic: Medicine, Economics etc. Overview of Genetic Algorithm, GA in problem solving, Implementation of GA

ROBOTICS

UNIT-1 INTRODUCTION

History, robot architectures, technical concepts of robotics, actuation and sensing, robotic system design, applications.

UNIT-2 COORDINATE SYSTEMS

Cartesian coordinates, transformation matrices, reference frames, relative and general transformations, orientation, inverse transformations, graphs.

UNIT-3 KINEMATICS- POSITION

Joints, members, reference frames, trigonometric solution, Homogeneous transformations, direct and inverse kinematics, orientation, precision, efficiency/complexity of kinematics solutions.

UNIT-4 KINEMATICS- MOTION

Derivatives, velocity and acceleration of a rigid bodies, differential movement, Jacobian, and singularities.

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UNIT-5

SENSORS, MEASUREMENTS AND PERCEPTION

Sensors hierarchy, interfaces, internal and external sensors, location, computer vision, applications, Basic concepts in control systems, digital control for position, System integration: mechanism, actuators and sensors

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ADVANCE SOFTWARE ENGINEERING

- UNIT-1 THE WIDER SOFTWARE ENGINEERING CONTEXT**
Embedded software and systems engineering: overview, examples and industrial realities; Project Management - Project Planning and Scheduling; Standards, e.g. PSS-05; Case studies
- UNIT-2 SOFTWARE ENGINEERING PROCESS**
Unified Software Development Process; Software Process Improvement; Software Economics; Software Quality
- UNIT-3 SOFTWARE METRICS**
Software Metric definition; Various metrics available; Measurement, Estimation and Prediction; Requirements Management; Configuration Management; Risk Management; Testing and Inspection
- UNIT-4 SOFTWARE ARCHITECTURE**
Architecture Description Languages; Pattern-Oriented Software Architecture; Component-based Development; Distributed Software Architectures using Middleware; Enterprise Application Integration; Architectures for Mobile and Pervasive Systems; Model Driven Architecture
- UNIT-5 ADVANCED MODELLING**
UML Extension Mechanisms; Object Constraint Language; Model Checking

DOT NET TECHNOLOGY

- UNIT 1 INTRODUCTION TO MICROSOFT .NET**
Business requirements fulfilled by the .NET initiative, core services and features provided in the .NET platform, features and benefits of XML Web services, clients available for the .NET platform and the different types of .NET-compatible smart devices, Benefits of the .NET Framework, components of the .NET Framework.
- UNIT-2 INTRODUCTION TO DESIGNING BUSINESS SOLUTIONS**
MSF Process Model and the MSF Team Model, key activities of each phase in the MSF Process Model and the deliverables associated with each phase.
- UNIT-3 CREATING THE CONCEPTUAL, LOGICAL AND PHYSICAL DESIGN**
Purpose of the planning phase of the MSF Process Model, role of the functional specification in the planning phase, purpose of conceptual design, Analysis and optimization of a conceptual design, benefits of logical design, logical design model for a business solution, Documentation of the outputs of logical design, role of physical design in the MSF Process Model, steps of physical design, Designing a programming model.
- UNIT-4 DESIGNING SECURITY SPECIFICATIONS**
Identifying potential threats, Applying mitigation technologies.
- UNIT-5 STABILIZING AND DEPLOYING THE SOLUTION**

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Goal, milestones, and deliverables of the MSF stabilizing phase, tasks involved in testing and piloting a solution, goal, milestones, and deliverables of the MSF deploying phase, steps for deploying the solution to a production environment, recommended activities involved in completing a project