

# **Harcourt Butler Technological Institute, Kanpur-208002**

**(An Autonomous Institute Affiliated to U. P. Technical University, Lucknow)**



## **Revised Syllabus**

### **Final Year Master of Computer Applications**

**(Effective from the session 2015-16)**

**UNIT-I: Introduction and Software Project Planning**

Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

**UNIT-II: Project Organization and Scheduling**

Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

**UNIT-III: Project Monitoring and Control**

Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.

**UNIT-IV: Software Quality Assurance and Testing**

Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model (CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process.

**UNIT-V: Project Management and Project Management Tools**

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

**Text and Reference Books:**

1. Software Project Management, M. Cotterell, Tata McGraw-Hill Publication.
2. Information Technology Project Management, Kathy Schwalbe, Vikas Pub. House.
3. Software Project Management, S. A. Kelkar, PHI Publication.

**ICA-502**  
**DATA WAREHOUSING AND DATA MINING**

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**Unit-I**

Overview, Motivation (for Data Mining), Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. **Data Reduction**:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.

**Unit-II**

**Concept Description**:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases–Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi-Dimensional Association rules from Relational Databases

**Unit-III**

**Classification and Predictions:**

What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbor classifiers, Genetic Algorithm.

**Cluster Analysis:**

Data types in cluster analysis, Categories of clustering methods, partitioning methods. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis

**Unit-IV**

**Data Warehousing:** Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mining.

**Unit-V**

Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

**Text and Reference Books:**

1. M. H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education
2. Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques", Elsevier
3. Sam Anahory, Dennis Murray, "Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems, 1/e " Pearson Education
4. Mallach, "Data Warehousing System", McGraw –Hill

**UNIT-I**

Introduction to Network Technologies and Cellular Communications: HIPERLAN: Protocol architecture, physical layer, Channel access control sub-layer, MAC sub-layer, Information bases and networking WLAN: Infrared vs. radio transmission, Infrastructure and ad hoc networks, IEEE 802.11. Bluetooth: User scenarios, Physical layer, MAC layer, Networking, Security, Link management GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services. Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture

**UNIT-II**

(Wireless) Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

**UNIT-III**

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

**UNIT-IV**

Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

**UNIT-V**

Mobile Adhoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs. Protocols and Tools: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

**Text and Reference Book:**

1. Jochen Schiller, "Mobile Communications", Addison- Wesley. (Chapters 4, 7, 9, 10, 11), second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028. (Chapters 11, 15, 17, 26 and 27)
3. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004.

## List of Elective - II

### HCA-511(Elective - II) COMPILER DESIGN

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#### Unit-I

Introduction to Compiler, Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, Implementation of lexical analyzers, lexical-analyzer generator, LEX-compiler, Formal grammars and their application to syntax analysis, BNF notation, ambiguity, YACC. The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG.

#### Unit-II

Basic Parsing Techniques: Parsers, Shift reduce parsing, operator precedence parsing, top down parsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR(0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables, constructing LALR sets of items.

#### Unit-III

Syntax-directed Translation: Syntax-directed Translation schemes, Implementation of Syntax directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser. More about translation: Array references in arithmetic expressions, procedures call, declarations, case statements.

#### Unit-IV

Symbol Tables: Data structure and representing scope information. Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors.

#### Unit-V

Introduction to code optimization: Loop optimization, the DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.

#### Text and Reference Books:

1. Aho, Sethi & Ullman, "Compiler Design", Addison Wesley.
2. Kenneth C. Louden, "Compiler Construction: Principles and Practice", Thomson Brooks Publication.
3. Allen I. Holub, "Compiler Design in C", PHI Publications.

**CLOUD COMPUTING**  
**ICA-512(Elective - II)**

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**3 1 0**

**UNIT-1**

Overview of Computing Paradigm-Recent trends in computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing. Evolution of Cloud computing, Business driver for adopting Cloud Computing.

Introduction to Cloud Computing-Cloud Computing (NIST Model),History of Cloud Computing, Cloud Service Providers. Properties, Pros & Cons of Cloud Computing, Cloud Computing v/s Cluster Computing v/s Grid Computing, Role of Open Standards.

**UNIT-2**

Cloud Computing Architecture- Cloud Computing Stack, Comparison with Traditional Computing Architecture (Client/server), Services provided at various levels, How Cloud Computing works, Role of Networks in Cloud Computing, Protocols used, Role of web-services.

Service Models (XaaS) –Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), Deployment Models-Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud.

**UNIT-3**

Service Management in Cloud Computing- Service level Agreements (SLA), Billing and Accounting, Comparing Scaling Hardware: Traditional v/s Cloud, Economics of Scaling: Benefitting enormously.

Managing data-Looking at data, Scalability and Cloud Services, Database and Data store in Cloud, Large Scale Data Processing.

**UNIT-4**

Cloud Security- Infrastructure security: Network level security, Host level Security, Application level Security, Data Security and Storage: Data privacy and Security Issues, Jurisdictional Issues raised by Data Location. Identity and Access Management, Access Control, Trust, Reputation, Risk.

Authentication in Cloud Computing, Client Access in Cloud, Cloud Contracting Model, Commercial and Business Considerations.

**UNIT-5**

Case Study on Open Source and Commercial Clouds- Eucalyptus, Microsoft Azure, Amazon EC2.

**REFERENCE BOOKS:**

1. Cloud Computing Bible, Barrie Sosinky, Wiley-India,2010.
2. Cloud Computing:Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M.Goscinski,Wile,2011.
3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gilliam, Springer,2012.
4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L.Krutz, Russell Dean Vines, Wiley-India,2010.

**ICA-513(Elective - II)**  
**SIMULATION AND MODELLING**

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**Unit-I**

System definition and components, stochastic activities, continuous and discrete Systems, System modeling, types of models, static and dynamic physical models, Static and dynamic mathematical models, Full corporate model, types of system study.

**Unit-II**

System simulation, Why to simulate and when to simulate, Basic nature of simulation, technique of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation, simulation of pure-pursuit problem single-server queuing system and an inventory problem, Monte Carlo simulation, Distributed Lag models, Cobweb model.

**Unit-III**

Simulation of continuous systems, analog vs. digital simulation, simulation of water reservoir system, simulation of a servo system, simulation of an autopilot Discrete system Simulation, Fixed time-step vs. event-to-event model, generation of random numbers, Test for randomness, Generalization of non-uniformly distributed random numbers, Monte-Carlo computation vs. stochastic simulation.

**Unit-IV**

System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, System Dynamics diagrams, Feedback in Socio-Economic systems, world model.

**Unit-V**

Simulation of PERT networks, Critical path computation, uncertainties in Activity duration, Resource allocation and consideration. Simulation software, Simulation languages, continuous and discrete simulation languages, Expression based languages, object-oriented simulation, general-purpose vs. application-oriented simulation packages, CSMP-III, MODSIM-III.

***Text and Reference Books:***

1. Geoffrey Gordon, "System Simulation", PHI
2. Narsingh Deo, "System Simulation with digital computer", PHI
3. Averill M. Law, W. David Kelton, "Simulation Modeling and Analysis", TMH

**INFORMATION SECURITY AND CYBER LAWS**  
**ICA-514(Elective - II)**

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**UNIT-1**

Concept of Cyberspace & Netizens Technology, Law and Society Object & Scope of the Information Technology Act, 2000 Electronic Records, Electronic Governance and Electronic Commerce.

**UNIT-2**

Jurisdiction under the IT Act-Territorial and Extra-Territorial Jurisdiction of the IT Act 2000 Concept of Digital Signatures and Cryptography, Digital Signature Certificate and Public Key Infrastructure, Authorities under the Act.

**UNIT-3**

Nature and scope of computer crime, Types of Cyber crimes-Hacking, Tampering with Computer source documents, cyber pornography, cyber stalking, cyber terrorism, cyber squatting, Cyber contraventions Penalties under the Act, Investigation, Procedure for search & Seizure, Liability of Network Service Providers.

**UNIT-4**

Intellectual Property Right issues in Cyberspace, Concept of property in Cyberspace, Copyright and related issues, Issues relating to Trademarks and Domain names, Liability for Hyperlinking and Metatags, Domain Name Dispute Resolution Policy, Role of ICANN.

**UNIT-5**

Laws, Investigation and Ethics: Cyber Crime, Information Security and Laws, Types & overview of Cyber Crimes, Cyber Law Issues in E-Business Management. Overview of Indian IT Act, Ethical Issues in Intellectual property rights, Copy Right, Patents, Data privacy and protection, Domain Name, Software piracy, Plagiarism, Issues in ethical hacking.

**Text and Reference Books:**

1. Rodney Rider-Guide to Cyber Laws
2. Mr. Vakul Sharma-Handbook of Cyber Laws
3. Justice Yatindra Singh-Cyber Laws
4. Dr. Sundeep Oberoi-E-Security and you



**DIGITAL IMAGE PROCESSING**  
**(ICA-515) (Elective - II)**

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**UNIT-I:**

**Introduction and Fundamentals**

Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.

**Image Enhancement in Spatial Domain**

Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions; Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.

**UNIT-II**

**Image Enhancement in Frequency Domain**

Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.

**Image Restoration**

A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only- Spatial Filtering – Mean Filters: Arithmetic Mean Filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

**UNIT-III**

**Color Image Processing**

Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.

**Morphological Image Processing**

Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

**UNIT-IV**

**registration**

Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth

**Segmentation**

Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

**UNIT-V**

**Feature Extraction** Representation, Topological Attributes, Geometric Attributes

**Description** Boundary-based Description, Region-based Description, Relationship.

**Object Recognition** Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching

**Text and Reference Books:**

1. Digital Image Processing 2nd Edition, Rafael C. Gonzales and Richard E. Woods. Published by: Pearson Education.
2. Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY.
3. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.

## List of Elective - III

### ICA-521 (Elective – III) ADVANCE DATABASE MANAGEMENT SYSTEMS

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#### Unit-I

Query Processing, Optimization & Database Tuning: Algorithms for Executing Query Operations. Heuristics For Query Optimizations, Estimations Of Query Processing Cost, Join Strategies For Parallel Processors, Database Workloads, Tuning Decisions, DBMS Benchmarks, Clustering & Indexing, Multiple Attribute Search Keys, Query Evaluation Plans, Pipelined Evaluations, System Catalogue In RDBMS.

#### Unit-II

Extended Relational Model & Object Oriented Database System: New Data Types, User Defined Abstract Data Types, Structured Types, Object Identity, Containment, Class Hierarchy, Logic Based Data Model, Data Log, Nested Relational Model and Expert Database System.

#### Unit-III

##### **Distributed Database System:**

Structure of Distributed Database, Data Fragmentation, Data Model, Query Processing, Semi Join, Parallel & Pipeline Join, Distributed Query Processing in R\* System, Concurrency Control in Distributed Database System, Recovery in Distributed Database System, Distributed Deadlock Detection and Resolution, Commit Protocols.

#### Unit-IV

##### **Enhanced Data Model For Advanced Applications:**

Database Operating System, Introduction to Temporal Database Concepts, Spatial and Multimedia Databases, Data Mining, Active Database System, Deductive Databases, Database Machines, Web Databases, Advanced Transaction Models, Issues in Real Time Database Design.

#### Unit-V

##### **Introduction to Expert Database and Fuzzy Database System:**

**Expert DataBases:** Use of Rules of Deduction in Databases, Recursive Rules.

**No SQL Databases:** Concepts

#### **Text and Reference Books:**

1. Majumdar & Bhattacharya, "Database Management System", TMH.
2. Korth, Silbertz, Sudarshan, "Database Concepts", Mc Graw Hill.
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addison Wesley.
4. Date C J, "An Introduction to Database System", Addison Wesley.
5. Ramakrishnan Gehrke, "Database Management System", McGraw Hill.
6. Bernstein, Hadzilacous, Goodman, "Concurrency Control & Recovery", Addison Wesley.
7. Ceri & Palgatti, "Distributed Databases", McGraw Hill.

**SOFTWARE QUALITY ENGINEERING**  
**(ICA-522) (Elective – III)**

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**3 1 0**

**UNIT-I: Introduction**

Defining Software Quality, Software Quality Attributes and Specification, Cost of Quality, Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction, and Containment, Overview of Different Types of Software Review, Introduction to Measurement and Inspection Process, Documents and Metrics.

**UNIT-II: Software Quality Metrics**

Product Quality Metrics: Defect Density, Customer Problems Metric, Customer Satisfaction Metrics, Function Points, In-Process Quality Metrics: Defect Arrival Pattern, Phase-Based Defect Removal Pattern, Defect Removal Effectiveness, Metrics for Software Maintenance: Backlog Management Index, Fix Response Time, Fix Quality, Software Quality Indicators.

**UNIT-III: Software Quality Management and Models**

Modeling Process, Software Reliability Models: The Rayleigh Model, Exponential Distribution and Software Reliability Growth Models, Software Reliability Allocation Models, Criteria for Model Evaluation, Software Quality Assessment Models: Hierarchical Model of Software Quality Assessment.

**UNIT-IV: Software Quality Assurance**

Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software, SQA Techniques, Statistical Quality Assurance, Total Quality Management, Quality Standards and Processes.

**UNIT-V: Software Verification, Validation & Testing:**

Verification and Validation, Evolutionary Nature of Verification and Validation, Impracticality of Testing all Data and Paths, Proof of Correctness, Software Testing, Functional, Structural and Error-Oriented Analysis & Testing, Static and Dynamic Testing Tools, Characteristics of Modern Testing Tools.

**Text and Reference Books:**

1. Jeff Tian, Software Quality Engineering (SQE), Wiley-Interscience, 2005; ISBN 0-471-71345-7.
2. Metrics and Models in Software Quality Engineering, Stephen H. Kan, Addison-Wesley (2002)

**ICA-523(Elective – III)**  
**ARTIFICIAL INTELLIGENCE**

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**UNIT-I: Introduction**

Introduction to Artificial Intelligence, Brief history, Various approaches to AI, Areas of application, Simulation of sophisticated & Intelligent Behavior in different area, Problem solving in games, natural language processing, automated reasoning, and visual perception, Knowledge and its role in AI, Heuristic algorithm versus solution guaranteed algorithms, Introduction to soft computing.

**UNIT-II: Searching in State Space**

Representing problems in state space, Informed versus uninformed search, Production System Model, Evaluation of the Production System, Depth First Search and Breadth First Search, Heuristics, Heuristic Search Techniques: Hill Climbing, Best First search, A\* Algorithm, Branch and Bound, Cryptarithmic Problem, Means End Analysis, AO\* Algorithm, Game Playing: MINMAX Search, Alpha-Beta Pruning, Heuristic Estimation.

**UNIT-III: Knowledge Representation and Reasoning**

Propositional Logic, First Order Predicate Logic, Graphs, Associative Network, Semantic Networks, Conceptual Dependencies, Frames, Scripts, Horn Clauses, Introductory Examples from PROLOG, Case Grammar Theory, Production Rules Knowledge Base, The Interface System, Forward & Backward Deduction, Inference System in Propositional and Predicate Logic, Reasoning under Uncertainty.

**UNIT-IV: Understanding Natural Languages.**

Various Approaches of NLP, Parsing techniques, Context free and transformational grammars, Transition nets, Augmented transition nets, Fillmore's grammars, Grammar free analyzers, Sentence generation, and translation, Introduction to Pattern Recognition, Structured Description, Symbolic Description, Machine Perception, Object Identification, Speech Recognition.

**UNIT-V: Expert Systems**

Architecture of Expert System, Representing and using domain knowledge, Expert System Shell, Explanation System, Knowledge Acquisition System, Case study of Existing Expert Systems like DENDRAL, MYCIN, Development of a small Expert System using programming Languages and tools like LISP, PROLOG, JESS.

**Text and Reference Books:**

1. N. J. Nilsson, "Artificial Intelligence: A New Synthesis", Elsevier Publications.
2. Charnick, "Introduction to A.I.", Addison Wesley.
3. Rich & Knight, "Artificial Intelligence", McGraw-Hill Publication.
4. Winston, "LISP", Addison Wesley
5. Marcellous, "Expert System Programming", PHI
6. Elamie, "Artificial Intelligence", Academic Press
7. Lioyed, "Foundation of Logic Processing", Springer Verlag
8. D. W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI.  
ISBN: 0201729156

**Unit-I**

Introduction to security attacks, services and mechanism, introduction to cryptography. Conventional Encryption: Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block ciphers.

Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation.

**Unit-II**

Introduction to graph, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, primality testing, Euclid's Algorithm, Chinese Remainder theorem, discrete logarithms. Principals of public key crypto systems, RSA algorithm, security of RSA, key management, Diffie-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, Elganel encryption.

**Unit-III**

Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm.

**Unit-IV**

Authentication Applications: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME.

**Unit-V**

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET). System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems.

**Text and Reference Books:**

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Prentice Hall, New Jersey.
2. Johannes A. Buchmann, "Introduction to Cryptography", Springer-Verlag.
3. Bruce Schneier, "Applied Cryptography".

**UNIT I BIOMETRICS**

Biometrics - Introduction- benefits of biometrics over traditional authentication systems ,benefits of biometrics in identification systems, selecting a biometric for a system, Applications – Key biometric terms and processes ,biometric matching methods ,Accuracy in biometric systems.

**UNIT II PHYSIOLOGICAL BIOMETRIC TECHNOLOGIES**

Physiological Biometric Technologies: Fingerprints ,Technical description, characteristics, Competing technologies, strengths , weaknesses , deployment , Facial scan , Technical description , characteristics , weaknesses , deployment , Iris scan , Technical description , characteristics ,strengths , weaknesses , deployment , Retina vascular pattern , Technical description , characteristics , strengths , weaknesses ,deployment , Hand scan , Technical description,characteristics , strengths , weaknesses deployment , DNA biometrics.

**UNIT III BEHAVIORAL BIOMETRIC TECHNOLOGIES**

Behavioral Biometric Technologies: Handprint Biometrics , DNA Biometrics , signature and handwriting technology ,Technical description , classification , keyboard /keystroke dynamics , Voice , data acquisition , feature extraction , characteristics , strengths ,Weaknesses , deployment.

**UNIT IV MULTI BIOMETRICS**

Multi biometrics: Multi biometrics and multi factor biometrics , two-factor authentication with passwords ,tickets and tokens , executive decision , implementation Plan.

**UNIT V CASE STUDIES**

Case studies on Physiological, Behavioral and multifactor biometrics in identification systems.

**REFERENCES**

1. Samir Nanavathi, Michel Thieme and Raj Nanavathi, “Biometrics - Identity verification in a network”, Wiley Eastern, 2002.
2. John Chirillo and Scott Blaul, “Implementing Biometric Security”, Wiley Eastern Publications, 2005.
3. John Berger, “Biometrics for Network Security”, Prentice Hall, 2004.