

**JAWAHARLALNEHRUTECHNOLOGICALUNIVERSITYGURAJADAVIZIANAGARAM**  
**Syllabus for Pre-Ph.D Examination**  
**INFORMATION TECHNOLOGY**

<b>PAPER – I</b>		<b>Subject Code</b>
<b>S.No</b>	<b>Subject</b>	
1	Advanced Databases	<b>PH2412101</b>
2	Artificial Intelligence and Soft Computing	<b>PH2412102</b>
3	Code Optimization	<b>PH2412103</b>
4	Data Mining and Knowledge Discovery	<b>PH2412104</b>
5	Digital Image Processing	<b>PH2412105</b>
6	Distributed Computing	<b>PH2412106</b>
7	Distributed Databases	<b>PH2412107</b>
8	Distributed Operating System	<b>PH2412108</b>
9	Big Data Analytics	<b>PH2412109</b>
10	Human Computer Interaction	<b>PH2412110</b>
11	Information Retrieval	<b>PH2412111</b>
12	Multi-Media and Application Development	<b>PH2412112</b>
13	Network Security	<b>PH2412113</b>
14	Internet of Things	<b>PH2412114</b>
15	Soft Computing	<b>PH2412115</b>

<b>PAPER – II</b>		<b>Subject Code</b>
<b>S.No</b>	<b>Subject</b>	
1	Advanced Computer Architecture	<b>PH2412201</b>
2	Advanced Data Structures and Algorithms	<b>PH2412202</b>
3	Advanced Unix Programming	<b>PH2412203</b>
4	Advanced Computer Networks	<b>PH2412204</b>
5	Bio-Informatics	<b>PH2412205</b>
6	Cyber Security	<b>PH2412206</b>
7	Computer Communication	<b>PH2412207</b>
8	Deep Learning	<b>PH2412208</b>
9	Machine Learning	<b>PH2412209</b>
10	Mobile Computing	<b>PH2412210</b>
11	Parallel Computing & Algorithms	<b>PH2412211</b>
12	Pattern Recognition	<b>PH2412212</b>
13	Scalable Parallel Computing Architectures	<b>PH2412213</b>
14	Secured DataBase Application Development	<b>PH2412214</b>
15	Wireless Networks and Mobile Computing	<b>PH2412215</b>

**PAPER – I**  
**(PH2412101)ADVANCED DATABASES**

**UNIT I: Introduction:**

Distributed Data Processing, Distributed Databases System, promises of DDBS, Problem areas.

**Overview of Relational DBMS:** Relational Databases Concepts, Normalization, Integrity rules, Relational data languages.

**UNIT II: Distributed DBMS Architecture:**

Architectural Models for Distributed DBMS, DDMBS Architecture.

**Distributed Database Design:**

Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

**UNIT III: Query Processing and Decomposition:**

Query processing Objectives, Characterization of query processors, layers of query processing, query decomposition, Localization of distributed data.

**UNIT IV: Distributed query Optimization:**

Query optimization, centralized query optimization, Distributed query optimization algorithms.

**UNIT V: Distributed object Database Management Systems:**

Fundamental object concepts and Models, Object Distributed Design, Architectural Issues, Object Management, Distributed Object storage, Object query Processing.

**Object Oriented Data Model:** Inheritance, object identity, persistent programming languages, persistence of objects, comparing OODBMS and ORDBMS.

**REFERENCE BOOKS**

1. Principles of Distributed Database Systems, 2/e, OZSU, Valduriez, Sridhar, Pearson, 2001
2. Distributed Databases, Stefan Seri, Pelagatti Willipse, TMH
3. Database System Concepts, 5/e, Korth, Silberschatz, Sudershan, TMH
4. Database Management Systems, 3/e, Raghuramakrishnan, Johhanes Gehrke, TMH
5. Data Base Principles, Programming, and Performance, 2/e, P O' Neil, E O'Neil, Elsevier

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412102)**  
**ARTIFICIAL INTELLIGENCE AND SOFT COMPUTING**

**UNIT I**

**Introduction:**

AI problems, AI technique, Problem as state space search, problem characteristics, production systems, types of production systems, Design of Search programs, Heuristic search techniques: Generate and test, Hill climbing, Best first search, Problem reduction, Constraint satisfaction, Means-Ends Analysis.

**UNIT II**

**Game Playing:** Minimax search procedure, adding alpha-beta cut-offs, additional refinements, Iterative deepening, Statistical Reasoning: Probability & Bayes theorem, Certainty factors and Rules based systems, Bayesian Networks.

**Knowledge Representation** Theorem proving using Predicate logic, Resolution, Natural Deduction, Knowledge representation using Rules, Forward versus Backward Reasoning, Matching, Control Artificial Knowledge, **Knowledge Structures**

**UNIT III**

**Planning:** Components of planning system, goal stack planning, nonlinear planning using constraint posting, Hierarchical planning, Reactive systems

**Natural Language Processing:** Steps in NLP, Syntactic processing, Semantic analysis, Discourse and Pragmatic processing, Statistical NLP, Spell checking.

**UNIT IV**

**Learning:** Rote learning-by example, Explanation based learning, Discovery, Analogy, Formal learning theory, NN learning and Genetic learning.

**Genetic Algorithms:** survival of the fittest principle in Biology, Genetic Algorithms, Significance of Genetic operators, termination parameters, Evolving Neural nets, Ant Algorithms

**UNIT V**

**Fuzzy Set & Logic Theory:** Classical & Fuzzy set theory, Interval Arithmetic's, Operations on Fuzzy sets

Classical logic theory, Boolean Logic, Multi valued Logic.

**Applications of Fuzzy Logic:** PQE – Decision Making Investment – Examples

**Fuzzy Rule base and Fuzzy Modelling:** If-Then Rules, System modelling, Static fuzzy systems, Parameter Identification PLC, closed loop, fuzzy controllers, examples, Fuzzy PID controllers – type 1 and type 2 .

**REFERENCE BOOKS:**

1. Intelligence, 3/e, E.Rich, K.Knight, TMH.
2. Introduction to Fuzzy Systems, Guanrong Chen, Trung Tat Pham, Chapman & Hall/CRC, 2009.
3. Artificial Intelligence, A Modern Approach, 2/e, Stuart Russel, Peter Norvig, PHI/PEA.
4. Artificial Intelligence, 5/e, George F Luger, PEA.
5. Artificial Intelligence, 3/e, Patrick Henry Winston, PEA.
6. Artificial Intelligence and Expert Systems, Patterson, PHI .
7. Artificial Intelligence, A Systems Approach, Tim Jones, Infinity Science Press .

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412103)CODE OPTIMIZATION**

**Unit I: Introduction:**

Review of Compiler Structure, Advanced Issues in Elementary Topics, The Importance of Code Optimization, Structure of Optimizing Compilers, Placement of Optimizations in Aggressive Optimizing Compilers

**Compiler Internal Representations and Run time support:**

Intermediate Representations, Intermediate Languages, Representing intermediate languages in ICAN, ICAN Naming of Data Structures and Routines that Manipulate Intermediate Code, Other Intermediate-Language Forms, Run-Time Support: Data Representations and Instructions, Register Usage, The Local Stack Frame, The Run-Time Stack, Parameter-Passing Disciplines, Procedure Prologues, Epilogues, Calls, and Returns, Code Sharing and Position-Independent Code, Symbolic and Polymorphic Language Support

**Unit II: Control Flow Analysis:**

Approaches to Control-Flow Analysis, Depth-First Search, Preorder Traversal, Postorder Traversal, and Breadth-First Search, Dominators, Loops and Strongly Connected Components, Reducibility, Interval Analysis and Control Trees, Structural Analysis

**Unit III: Data-Flow Analysis:**

Reaching Definitions, Basic Concepts: Lattices, Flow Functions, and Fixed Points, Iterative Data-Flow Analysis, Lattices of Flow Functions, Control-Tree-Based Data-Flow Analysis, Structural Analysis, Interval Analysis, Other Approaches, Du-Chains, Ud-Chains, and Webs, Dealing with Arrays, Structures, and Pointers, Automating Construction of Data-Flow Analyzers

**Unit IV: Dependence Analysis and Optimization:**

Dependence Analysis and Dependence Graph: Dependence Relations, Basic-Block Dependence DAGs, Dependences in Loops, Dependence Testing, Program-Dependence Graphs

Introduction to Optimization: Importance of Individual Optimizations, Order and Repetition of Optimizations, Early Optimizations: Constant-Expression Evaluation, Scalar Replacement of Aggregates, Algebraic Simplifications and Reassociation, Value Numbering, Copy Propagation, Sparse Conditional Constant Propagation

**Unit V: Procedural/Inter-procedural Analysis and Optimizations**

Tail-Call Optimization and Tail-Recursion Elimination, Procedure Integration, In-Line Expansion, Leaf-Routine Optimization and Shrink Wrapping, Interprocedural Control-Flow Analysis: The Call Graph, Interprocedural Data-Flow Analysis, Interprocedural Constant Propagation, Interprocedural Alias Analysis, Interprocedural Optimizations, Interprocedural Register Allocation

**REFERENCE BOOKS :**

1. Advanced Compiler Design and Implementation, Muchnick, Elsevier, 2008.
2. Engineering a Compiler, Keith D Cooper, Linda Torczon, Elsevier.
3. Compiler Design in C, Allen Holub, PHI, 1990.
4. Compilers Principles, Techniques and Tools, Aho, Sethi, Ullman, PEA, 2006.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

5. Crafting a compiler with C, Charles N. Fischer, Richard J. Leblanc, Benjamin Cummings, Wesley.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412104) DATA MINING AND KNOWLEDGE DISCOVERY**

**Unit I: Introduction to Data Mining:**

Types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity

**Exploring Data:** Data Set, Summary Statistics, Visualization, OLAP and multi dimensional data Analysis

**Unit II: Classification:**

Basic Concepts, Decision Trees, and model evaluation: General approach for solving a classification problem, Decision Tree induction, Model over fitting: Due to presence of noise, due to lack of representation samples, Evaluating the performance of classifier.

**Classification-Alternative techniques:**

Nearest Neighbourhood classifier, Bayesian Classifier, Support Vector Machines: LinearSVM, Separable and Non Separable case.

**Unit III: Association Analysis:**

Problem Definition, Frequent Item-set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithms, Handling categorical, continuous attributes, concept hierarchy, sequential, sub-graph patterns

**Unit IV: Clustering:** Overview, K-means, Agglomerative Hierarchical clustering, DBSCAN

**Cluster Evaluation:** Overview, Unsupervised Cluster evaluation using cohesion and separation, using the proximity matrix, Scalable clustering algorithms.

**Unit V: Web Data mining:**

Introduction, Web terminology and characteristics, web content mining, web usage mining, web structure mining, Search Engines: Characteristics, Functionality, Architecture, Ranking of web pages, Enterprise search

**REFERENCE BOOKS:**

1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, PEA.
2. Introduction to Data Mining with Case Studies, GK Gupta , Prentice Hall.
3. Data Mining: Introductory and Advanced Topics, Margaret H Dunham, PEA, 2008.
4. Fundamentals of data warehouses, 2/e, Jarke, Lenzerini, Vassiliou, Vassiliadis, Springer.
5. Data Mining Theory and Practice, Soman, Diwakar, Ajay, PHI, 2006.
6. Data Mining, Concepts and Techniques, 2/e, Jiawei Han , Micheline Kamber , Elsevier, 2006.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412105)DIGITAL IMAGE PROCESSING**

**Unit I: Digital Image fundamentals:**

Introduction, An image model, sampling & quantization, basic relationships between Pixels, imaging geometry.

**Unit II: Image Transforms:**

Properties of 2 – D Fourier transform FFT algorithm and other separable image transforms. Walsh transforms. Hadamard, Cosine, Haar, Slant transforms, KL transforms and their properties.

**Unit III: Image Enhancement and restoration:**

Background, enhancement by point processing, histogram processing, spatial filtering and enhancement in frequency domain, color image processing, Degradation model, Algebraic approach to restoration, inverse filtering, least mean squares and interactive restoration, geometric transformations

**Unit IV: Image Representation and compression:**

Various schemes for representation, boundary descriptors, and regional descriptors , Fundamentals of image compression modes, error free compression, lossy compression, image compression standards.

**Unit V: Image segmentation and reconstruction:**

Detection of discontinuities, edge linking and boundary detection thresholding, region – oriented segmentation, Image reconstruction from Projections, Radon Transforms; Convolution/Filter back – Project Algorithms.

**REFERENCE BOOKS**

1. Fundamentals of Digital Image Processing, A.K.JAIN, PHI
2. Fundamentals of Digital Image Processing, Anna durai, shanmuga lakshmi, Pearson
3. Introduction to Digital Image Processing, Alasdair, McAndrew, Cengage
4. Digital Image Processing, 3/e, GONZALEX, WOODS, Addison Wesley
5. Digital Image Processing, Castleman, Pearson
6. Digital Image Processing, S Jayaraman, SEsakkirajan, T Veerakumar, TMH

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412106)DISTRIBUTED COMPUTING**

**Unit I: Introduction to distributed programming:**

Anatomy of a Distributed Application, Requirements for Developing Distributed Applications, What Does Java Provide?

**Introduction to sockets programming:** Sockets and Streams, URLs, URLConnections, and ContentHandlers, The ClassLoader

**Unit II: Distributing Objects:**

Why Distribute Objects?, What's So Tough About Distributing Objects?, Features of Distributed Object Systems, Distributed Object Schemes for Java, CORBA, Java RMI, RMI vs. CORBA

**Threads:** Thread and Runnable, Making a Thread, Managing Threads at Runtime, Networked Threads

**Unit III: Message-Passing Systems:**

Messages Defined, Why Do We Need Messages?, Message Processing, Fixed Protocols, Adaptable Protocols, Message Passing with Java Events, Using Remote Objects

**Databases:** An Overview of JDBC, Remote Database Applications, Multi-Database Applications

**Unit IV: RMI:**

The Basic Structure of RMI, The Architecture Diagram Revisited, Implementing the Basic Objects, The Rest of the Server, The Client Application

**The RMI Registry:** Why Use a Naming Service? The RMI Registry, The RMI Registry Is an RMI Server, Examining the Registry, Limitations of the RMI Registry, Security Issues

**Naming Services:** Basic Design, Terminology, and Requirements, Requirements for Our Naming Service, Federation and Threading, The Context Interface, The Value Objects, ContextImpl, Switching Between Naming Services, The Java Naming and Directory Interface (JNDI)

**The RMI Runtime:** Reviewing the Mechanics of a Remote Method Call, Distributed Garbage Collection, RMI's Logging Facilities, Other JVM Parameters

**Unit V: Service Oriented Architecture:**

Introduction, Defining a Service, Defining SOA, Identifying Service Candidates, Identifying Different Kinds of Services, Modeling Services, Making a Service Composable, Supporting Your SOA Efforts, Selecting a Pilot Project, Establishing Governance

**REFERENCE BOOKS:**

1. Java Distributed Computing, Jim Farley, O'Reilly.
2. Java RMI Designing and Building, The Basics of RMI Applications, William Grosso, O'Reilly.
3. Java SOA Cookbook SOA Implementation Recipes, Tips, Techniques, Eben Hewitt, O'Reilly, 2009.
4. Service Oriented Architecture With Java, Malhar Barai, Vincenzo Caselli, Binildas A. Christudas, Packt Publishing, 2008.
5. Distributed Programming with Java, Qusay H. Mahmoud, Manning Publisher 2000.
6. Java in Distributed Systems, Concurrency, Distribution and Persistence, Marko Boger, 2001.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

7. Developing Distributed and E-commerce Applications, Darrel Ince, 2/e, Wesly, 2004.
8. Java Message Service (O'Reilly Java Series), Richard Monson-Haefel, David Chappell.
9. Sun SL 301 Distributed Programming with Java.
10. Java Tutorial, <http://java.sun.com/docs/books/tutorial/index.html>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412107)DISTRIBUTED DATABASES**

**Unit I: Introduction :**

Features of distributed databases, features of Centralized databases, level of distributed transparency - Reference Architecture, types of Data Fragmentation, distribution Transparency, Access primitives, and Integrity constraints.

**Unit II: Distributed Database design :**

A frame work, the design of database fragmentation, the allocation of fragments.

**Unit III: Query Processing :**

Translation of global queries into fragment queries, query optimization.

**Distributed Transaction Management :** A framework, transaction atomicity, 2-phase commit.

**Unit IV: Concurrency control:**

Foundations, distributed deadlocks, timestamps.

**Reliability:** Basic concepts, commit protocols, consistent view of Network, Detection and Resolution of Inconsistencies, check points and cold restart.

**Unit V: Commercial Systems:**

Tranclem's ENCOMPASS Distributed database systems, IBM's Inter system communication, feature of distributed ingress and Oracle.

**Heterogeneous databases:** General problems – brief study of multi base.

**REFERENCE BOOKS:**

1. Distributed Database systems Principles and Systems, Ceri S. Pelagatti. G, MGH.
2. Principles of Distributed Database Systems, 2/e, M. Tamer Ozsu, Sridhar, PEA.
3. Database system Concepts, 5/e, Silberschatz, F.Korth, Sundrashan, MGH, 2006.
4. Modern database Management, 7/e, Hoffer, Prescott, McFadden, PEA, 2007.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412108)DISTRIBUTED OPERATING SYSTEMS**

**Unit I: Processes**

**THREADS:** Introduction to Threads, Threads in Distributed Systems; **CLIENTS:** User Interfaces, Client-Side Software for Distribution Transparency **SERVERS:** General Design Issues, Object Servers; **CODE MIGRATION:** Approaches to Code Migration, Migration and Local Resources, Migration in Heterogeneous Systems, Example: D'Agents  
**SOFTWARE AGENTS:** Software Agents in Distributed Systems, Agent Technology

**Unit II: Naming Systems**

**NAMING ENTITIES:** Names, Identifiers, and Addresses, Name Resolution, The Implementation of a Name Space, Example: DNS, X.500  
**LOCATING MOBILE ENTITIES:** Naming versus Locating Entities, Simple Solutions, Home-Based Approaches, Hierarchical Approaches  
**REMOVING UNREFERENCED ENTITIES:** The Problem of Unreferenced Objects, Reference Counting, Reference Listing, Identifying Unreachable Entities

**Unit III: Synchronization**

Clock synchronization, logical clocks, global state, election algorithms, mutual exclusion, distributed transactions

**Unit IV: Consistency and Replication**

Introduction, Data-Centric Consistency Models, Client-Centric Consistency Models, Distribution Protocols, Consistency Protocols, Examples: Orca and Causally-Consistent Lazy Replication

**Unit V: Fault Tolerance**

Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery

**REFERENCE BOOKS:**

1. Distributed Systems , Principles and Paradigms, 2/e, Tanenbaum, Maarten Van Steen, PHI.
2. Advanced concepts in Operating Systems, Mukesh Singhal, Niranjana G. Shivaratri, TMH, 2005.
3. Distributed Operating Systems and Algorithm Analysis, Chow, Johnson, PEA
4. Distributed Systems Concepts and Design, 4/e, George Coulouris, Dollimore, Kindberg, PEA.
5. Distributed Operating Systems, Pradeep K. Sinha, PHI, 2009.
6. Operating Systems, Internals & Design Principles, 6/e, William Stallings, PEA.
7. Distributed Systems Computing over Networks, Joel M. Crichton, PHI.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412109)BIG DATA ANALYTICS**

**UNIT – I:**

**Data structures in Java:** Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

**UNIT – II:**

**Working with Big Data:** Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring the Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

**UNIT – III:**

**Writing MapReduce Programs:** A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

**UNIT – IV:**

**Hadoop I/O:** The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

**UNIT – V:**

**Pig:** Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

**Applying Structure to Hadoop Data with Hive:**

Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

**TEXT BOOKS:**

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss

**REFERENCE BOOKS:**

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412110)HUMAN COMPUTER INTERACTION**

**UNIT I: Introduction:**

Importance of user Interface – definition, importance of good design. Benefits of good design.  
A brief history of Screen design

**The graphical user interface:** Popularity of graphics, direct manipulation, graphical system, Characteristics, Web user –interface popularity, characteristics- Principles of user interface.

**UNIT II: Design process:**

Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

**UNIT III: Screen Designing :**

Design goals, Screen planning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, Visually pleasing composition, amount of information, focus and emphasis, presentation information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

**UNIT IV: Windows:**

Windows new and Navigation schemes selection of window, selection of devices based and screen based controls.

**UNIT V: Components :**

Components text and messages, Icons and increases, Multimedia, colors, uses problems, choosing colors.

**Interaction Devices:**

Keyboard and function keys, pointing devices, speech recognition digitization and generation, image and video displays, drivers.

**REFERENCE BOOKS :**

1. The Essential guide to user interface design, Wilbert O Galitz, Wiley DreamaTech.
2. Designing the user interface. 3/e, Ben Shneidermann , PEA.
3. Human Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, PEA.
4. Interaction Design PRECE, ROGERS, SHARPS, Wiley Dreamtech.
5. User Interface Design, Soren Lauesen , PEA.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412111)INFORMATION RETRIEVAL**

**Unit I : Introduction to Information storage and retrieval systems:**

Domain Analysis of IR systems, IR and other types of Information Systems, IR System Evaluation

**Introduction to Data structures and algorithms related to Information Retrieval:** Basic Concepts, Data structures, Algorithms.

**Unit II: Inverted Files and Signature Files:**

Introduction, Structures used in Inverted Files, Building an Inverted file using a sorted array, Modifications to the Basic Techniques.

Signature Files: Concepts of Signature files, Compression, Vertical Partitioning, Horizontal Partitioning.

**Unit III: New Indices for Text, Lexical Analysis and Stoplists:**

**PAT Trees and PAT Arrays:** Introduction, PAT Tree structure, Algorithms on the PAT Trees, Building PAT Trees as PATRICA Trees, PAT representation as Arrays. Lexical Analysis, Stoplists.

**Unit IV: Stemming Algorithms and Thesaurus Construction:**

Types of Stemming algorithms, Experimental Evaluations of Stemming, Stemming to Compress Inverted Files.

Thesaurus Construction: Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri.

**Unit V: String Searching Algorithms:**

Introduction, Preliminaries, The Naive Algorithm, The Knutt-Morris-Pratt Algorithm, The Boyer-Moore Algorithm, The Shift-Or Algorithm, The Karp-Rabin Algorithm.

**REFERENCE BOOKS**

1. Modern Information Retrieval, Ricardo Baeza-Yates, Neto, PEA, 2007.
2. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark Academic Press, 2000.
3. Information Retrieval: Algorithms and Heuristics , Grossman, Ophir Frieder, 2/e, Springer, 2004.
4. Information Retrieval Data Structures and Algorithms , Frakes, Ricardo Baeza-Yates, PEA
5. Information Storage and Retrieval, Robert Korfhage, John Wiley & Sons.
6. Introduction to Information Retrieval, Manning, Raghavan, Cambridge University Press.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412112)MULTIMEDIA AND APPLICATION DEVELOPMENT**

**UNIT I : Fundamental concepts in Text and Image:**

Multimedia and hypermedia, world wide web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

**UNIT II: Fundamental Concepts in Cideo and Digital Audio:**

Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

**UNIT III: Application Development:**

An OOP Application Frame work, Using Components with ActionScript MovieClip Subclasses.

**UNIT IV: Multimedia Data Compression:**

Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT). **Basic Video Compression Techniques:** Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

**UNIT V: Multimedia Networks:**

Basics of Multimedia Networks, Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand (MOD).

**REFERENCE BOOKS :**

1. Fundamentals of Multimedia , Ze-Nian Li , Mark S. Drew, PHI/PEA.
2. Essentials ActionScript 2.0, Colin Moock, SPD O'REILLY.
3. Digital Multimedia, Nigel chapman & jenny chapman, Wiley-Dreamtech.
4. Macromedia Flash MX Professional 2004 Unleashed, PEA.
5. Multimedia & Communications Technology, Steve Heath, Elsevier (Focal Press).
6. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
7. Multimedia Basics, Weixel Thomson.
8. Multimedia Technology & Applications, David Hilman , Galgotia.
9. Multimedia Technologies, Banerji, Mohan Ghosh, MGH.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412113)NETWORK SECURITY**

**Unit I: Introduction to Network Security:**

Attacks, services, Security. A model of Inter network Security, Principles of Symmetric and public key cryptography, Steganography, One time PADS.

**Unit II: Crypto Graphic Algorithms (Block Cipher):**

RC2, GOST, CAST, BLOW FISH, SAFEER, RC5, NEWDES, CRAB, Theory of Block Cipher design.

**Unit III: Key Management and digital Signature Algorithms :**

Key lengths, Generating Keys, Transferring, Verification, Updating, Storing, Backup, Compromised, Lifetime of, Destroying Keys, key Exchange Protocols, Secure multiparty Communication, Public key Management. Authentication, Formal Analysis of Authentication, Digital Signature, DSA, DSA variants, One – Schnorr – Shamir digital Signatures, Esign,

**Unit IV: IP and Web security:**

IP Security Architecture, Authentication Header, Encapsulating Security, Pay load Key Management Issues. Web Security Web Security requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction

**Unit V: Mail Security:**

PGP, SNMP, SMIME, Intruders, Viruses and Related Threats, Firewall Design Principles, Trusted Systems.

**REFERENCE BOOKS:**

1. Applied Cryptography, 7/e, Bruce SCHNEIER John Wiley & Sons Inc.
2. Cryptography and Network Security, William Stallings, PHI.
3. Introduction to cryptography with coding Theory, 7/e, Wade Trappe, C. Washington, PEA.
4. Cryptography and Information Security, V.K. Pachghare, PHI.
5. Cryptography and Network Security, Forouzan, TMH, 2007.
6. Cryptography and Network Security, 2/e, Kahate , TMH.
7. Modern Cryptography, Wenbo Mao, PEA



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412114)INTERNET OF THINGS**

**UNIT- I**

Introduction to Internet of Things, Definition & Characteristics of IoT, Physical Design of IoT  
Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates  
Domain Specific IoTs: Home, Cities, Environment, Energy systems, Logistics, Agriculture,  
Health & Lifestyle

**UNIT- II**

IOT & M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, 1  
Need for IoT Systems Management , Simple Network Management Protocol (SNMP) ,  
Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems  
Management with NETCONF-YANG, NETOPEER

**UNIT- III**

IoT Platforms Design Methodology IoT Design Methodology, Case Study on IoT System for  
Weather Monitoring , Motivation for Using Python , IoT Systems - Logical Design using Python  
,Installing Python , Python Data Types & Data Structures ,Control Flow , Functions, Modules,  
Packages , File Handling I, Date/Time Operations , Classes ,Python Packages of Interest for IoT

**UNIT -IV**

IoT Physical Devices & Endpoints, Raspberry Pi , About the Board , Linux on Raspberry Pi ,  
Raspberry Pi Interfaces , Programming Raspberry Pi with Python , Other IoT Devices, IoT  
Physical Servers & Cloud Offerings , Introduction to Cloud Storage Models & Communication  
APIs , WAMP - AutoBahn for IoT , Xively Cloud for IoT , Python Web Application Framework  
- Django , Designing a RESTful Web API , Amazon Web Services for ,SkyNet IoT Messaging  
Platform

**UNIT -V**

Case Studies Illustrating IoT Design, Introduction, Home Automation, Cities, Environment,  
Agriculture, Productivity Applications  
Data Analytics for IoT , Introduction , Apache Hadoop, Using Hadoop MapReduce for Batch  
Data Analysis , Apache Oozie , Apache Spark , Apache Storm , Using Apache Storm for Realtime  
Data Analysis , Structural Health Monitoring Case Study , Tools for IOT, Chef Case  
Studies, NETCONF-YANG Case Studies.

**TEXTBOOKS:**

1. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

**REFERENCE BOOKS:**

- 1.Fundamentals of Python, K.A.Lambert and B.L.Juneja, Cengage Learning, 2012.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412115)SOFT COMPUTING**

**Unit I: Introduction:**

Uncertainty and Evidence, Shafer Dumpster belief and possibility Theory, Random sets and mass assignments, Dumpsters Rule, Fuzzy Measures and aggregation operators, Bayesian Networks. Graphical methods.

**Unit II: Automated Learning-1 and 2**

Automated Learning-1: Supervise vs. unsupervised learning, Decision Tree induction, rule induction algorithms.

Automated Learning-2: Bayesian network learning algorithms, Evolutionary algorithms.

**Unit III: Neural Networks and Fuzzy Methods:**

Neural Networks: Adaptive Networks, Supervised Learning NN, Reinforcement Learning, Unsupervised Learning.

Fuzzy set theory, fuzzy control (including model based control), and Fuzzy Decision trees.

**Unit IV: Hybrid systems:**

Neuro Fuzzy Systems, Back propagation Network supported by Fuzzy, GA based weight determination applications.

**Unit V: Genetic Algorithms and Applications**

Encoding, Fitness functions, reproduction, Fuzzy Genetic Algorithms.

Applications: Practical Examples from areas such as Medical, Management, and control, GA in fuzzy logic controller design.

**REFERENCE BOOKS**

1. Neuro Fuzzy and Soft Computing, A Computational approach to learning and Machine, Jyh-Shing Roger Jang, Cuen Tsai Sun, Eiji Mizurani, PEA.
2. Machine Learning, Tom Mitchell, MGH, 1997.
3. Soft Computing Techniques and Applications, Robert John, R. Birkenhead, Ralph Birkenhead.
4. Neural Networks, Fuzzy logic and genetic algorithms, S Rakasekharan, GA Vijayalakshmi, PHI.
5. Principles of Soft Computing, Sivanandam, Deepa, Wiley India, 2008.
6. Soft Computing and Intelligent Systems Design, Karry, De Silva, PEA, 2004.

## **PAPER – II**

### **(PH2412201)ADVANCED COMPUTER ARCHITECTURE**

#### **Unit I: Parallel Computer Models, Program and Network Properties:**

Parallel Computer Models: Multiprocessors and Multicomputers, Multivector and SIMD Computers,  
Program and Network Properties: Conditions of Parallelism, Program Partitioning and Scheduling, Program Flow Mechanisms, System Interconnect Architectures

#### **Unit II: Principles of Scalable Performance:**

Performance Metrics and Measures, Parallel Processing Applications, Speedup Performance Laws, Scalability Analysis and Approaches

#### **Unit III: Processors and Memory Hierarchy:**

Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology

#### **Unit IV: Bus, Cache, and Shared Memory:**

Backplane Bus Systems, Cache Memory Organizations, Shared-Memory Organizations, Sequential and Weak Consistency Models

#### **Unit V: Pipelining and Superscalar Techniques:**

Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design, Superscalar and Super pipeline Design

#### **Multiprocessors and Multicomputers:**

Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Three Generations of Multicomputers, Message-Passing Mechanisms

### **REFERENCE BOOKS**

1. Kai Hwang, Advanced computer Architecture: Parallelism, Scalability, Programmability, TMH, 2000.
2. Computer Architecture – A quantitative approach, 4/e, John L. Hennessey , David A. Patterson, Morgan Kaufmann / Elsevier, 2007.
3. Parallel Computing Architecture: A hardware/ software approach , David E. Culler, Jaswinder Pal Singh, Morgan Kaufmann / Elsevier, 1997.
4. Computer Organization and Architecture – Designing for Performance, 7/e, William Stallings, PEa, 2006.
5. Computer Organization and Design, 4/e, Patterson , Elsevier, 2008.
6. Computer Architecture & Parallel Processing, Kai Hwang, Faye A. Briggs, TMH

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412202)ADVANCED DATA STRUCTURES AND ALGORITHMS**

**Unit I: Lists, Stacks, Queues and Trees:**

Lists, Stacks and Queues: Abstract Data Types (ADTs), The List ADT, vector and list in the STL, Implementation of vector, Implementation of list, The Stack ADT, The Queue ADT.  
Trees: The Search Tree ADT - Binary Search Trees, AVL Trees, Splay Trees, B-Trees.

**Unit II: Hashing and Priority Queues:**

Hashing: General Idea, Hash Function, Separate Chaining, Hash Tables Without Linked Lists, Rehashing, Extendible Hashing  
Priority Queues: Implementations, Binary Heap, Applications of Priority Queues, *d*-Heaps, Leftist Heaps, Skew Heaps, Binomial Queues.

**Unit III: Sorting:**

Sorting: A Lower Bound for Simple Sorting Algorithms, Shellsort, Heapsort, Mergesort, Quicksort, Indirect Sorting, A General Lower Bound for Sorting, Bucket Sort, External Sorting.  
The Disjoint Set Class: Equivalence Relations, the Dynamic Equivalence Problem, Basic Data Structure, Smart Union Algorithms, Path Compression, Worst Case for Union-by-Rank and Path Compression, an Application.

**Unit IV: Graph Algorithms:**

Definitions, Topological Sort, Shortest-Path Algorithms, Network Flow Problems, Minimum Spanning Tree, Applications of Depth-First Search, Introduction to NP-Completeness.  
Algorithm Design Techniques: Greedy Algorithms, Divide and Conquer, Dynamic Programming, Randomized Algorithms, Backtracking Algorithms.

**Unit V: Amortized Analysis:**

An Unrelated Puzzle, Binomial Queues, Skew Heaps, Fibonacci Heaps, Splay Trees.  
Advanced Data Structures and Implementation: Top-Down Splay Trees, Red-Black Trees, Deterministic Skip Lists, AA-Trees, Treaps, *k*-d Trees, Pairing Heaps.

**REFERENCE BOOKS**

1. C & Data structures, N.B. Venkateswarulu, EV Prasad, S.Chand.
2. Data Structures and Algorithm Analysis in C++, 3/e, Mark Allen Weiss, PEA , 2007.
3. Data Structures Algorithms and Applications, 2/e, Sartaj Sahni, Universities Press, 2007.
4. Fundamentals of computer Algorithms, 2/e, Ellis Horowitz, Sartaj Sahni, Rajasekharan, Universities Press, 2008.
5. Data Structures and Algorithms, Aho, Ullman, PEA.
6. Data Structures and Algorithms in JAVA, Adam drozdek, Cengage .
7. Data Structures with JAVA™, Hubbard, Huray, PHI,2009.
8. Data Structures, Gilberg, Forouzan, Thomson.
9. Fundamentals of Data structures algorithms and application Sartaj Sahni, University Press.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412203)ADVANCED UNIX PROGRAMMING**

**UNIT I: Review of Unix Utilities and Shell Programming:**

File handling utilities, security by file permissions, process utilities, disk utilities, networking commands, backup utilities, text processing utilities, Working with the Bourne shell, What is a shell, shell responsibilities, pipes and input redirection, output redirection, here documents, the shell as a programming language, shell meta characters, shell variables, shell commands, the environment, control structures, shell script examples.

**UNIT II: Unix Files:**

Unix file structure, directories, files and devices, System calls, library functions, low level file access, usage of open, creat, read, write, close, lseek, stat, fstat, octl, umask, dup, dup2. The standard I/O (fopen, fclose, fflush, fseek, fgetc, getc, getchar, fputc, putc, putchar, fgets, gets), formatted I/O, stream errors, streams and file descriptors, file and directory maintenance (chmod, chown, unlink, link, symlink, mkdir, rmdir, chdir, getcwd), Directory handling system calls (opendir, readdir, closedir, rewinddir, seekdir, telldir)

**UNIT III: Unix Process: Threads and Signals:** What is process, process structure, starting new process, waiting for a process, zombie process, process control, process identifiers, system call interface for process management, fork, vfork, exit, wait, waitpid, exec, system, Threads, Thread creation, waiting for a thread to terminate, thread synchronization, condition variables, cancelling a thread, threads vs. processes, Signals, Signal functions, unreliable signals, interrupted system calls, kill and raise functions, alarm, pause functions, abort, sleep functions.

**UNIT IV: Data Management:** Management Memory ( simple memory allocation, freeing memory) file and record locking ( creating lock files, locking regions, use of read/ write locking, competing locks, other commands, deadlocks).

Interprocess Communication: Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pipes, FIFOs, streams and messages, namespaces, introduction to three types of IPC (systemV) message queues, semaphores and shared memory.

Message Queues: message structure, working message queues, Unix systemV messages, Unix kernel support for messages, Unix APIs for messages, client/server example.

**UNIT V: Semaphores:** Unix systemV semaphores, Unix kernel support for semaphores, Unix APIs for semaphores, file locking with semaphores.

**Shared Memory:** Unix systemV shared memory, working with a shared memory segment, Unix kernel support for shared memory, Unix APIs for shared memory, semaphore and shared memory example.

Sockets: Berkeley sockets, socket system calls for connection oriented protocol and connectionless protocol, example client/server program, advanced socket system calls, socket options.

**REFERENCE BOOKS**

1. Advanced Programming in the UNIX Environment, Stevens , PEA/PHI.
2. Unix Network Programming, Stevens PEA/PHI.
3. Advanced Unix programming, N.B. Venkateswarlu, BSP.
4. Unix Concepts and Applications, 3/e, Sumitabha Das, TMH.
5. Practical UNIX and Internet Security, 2/e, Simson Garfinkel, Gene Spafford, O'Reilly.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412204)ADVANCED COMPUTER NETWORKS**

**UNIT-I**

**Network layer:** Network Layer design issues: store-and-forward packet switching, services provided transport layers, implementation connection less services, implementation connection oriented services, comparison of virtual –circuit and datagram subnets. Routing Algorithm –shortest path routing, flooding, distance vector routing, link state routing, Hierarchical routing, Broadcast routing, Multicasting routing, routing for mobiles Hosts, routing in Adhoc networks- congestion control algorithms-Load shedding, Congestion control in Data gram Subnet.

**UNIT-II**

**IPV4 Address** address space, notations, classful addressing, classless addressing network addressing translation (NAT) , IPV6 Address structure address space, Internetworking need for network layer internet as a data gram, internet as connection less network. IPV4 datagram, Fragmentation, checksum, options. IPV6 Advantages, packet format, extension Headers, Transition form IPV4 to IPV6

**UNIT-III**

**Process to process delivery:** client/server paradigm, multiplexing and demultiplexing, connectionless versus connection-oriented services, reliable versus reliable.

UDP: Well-known ports for UDP, user datagram, check sum, UDP operation, and uses of UDP

TCP: TCP services, TCP features, segment, A TCP connection, Flow control, error control, congestion control.

SCTP: SCTP services SCTP features, packet format, An SCTP association, flow control, error control.

**Congestion control:** open loop congestion control, closed-loop congestion control, Congestion control in TCP, frame relay, **QUALITY OF SERVICE:** flow characteristics, flow classes **TECHNIQUES TO IMPROVE QOS:** scheduling, traffic shaping, resource reservation, admission control.

**UNIT –IV**

**Domain name system:** The name space, resource records, name servers E-mail: architecture and services, the user agent, message formats, message transfer, final delivery www: architecture overview, static web documents, dynamic web documents, Hypertext transfer protocol, performance elements, the wireless web.

**Multimedia:** introduction digital a audio , Audio compression, streaming audio, internet radio, voice over IP, introduction to video, video compression, video on demand, the Mbone-the multicast back bone

**UNIT –V**

**Emerging trends Computer Networks:**

**Mobile Adhoc networks :** applications of Adhoc networks, challenges and issues in MANETS,MAC layers issues, routing protocols in MANET, transport layer issues, Adhoc networks security.

**Wireless sensors networks:** WSN functioning, operation system support in sensor devices, WSN Characteristics, sensor network operation, sensor Architecture: cluster management; Wireless mesh networks WMN design, Issues in WMNs;

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**TEXT BOOKS:**

1. Data communications and networking 4th edition Behrouz A Fourzan, TMH
2. Computer networks 4th edition Andrew S Tanenbaum, Pearson
3. Computer networks, Mayank Dave, CENGAGE

**REFERENCE BOOKS:**

1. [http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Computer%20networks/New\\_index1.html](http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Computer%20networks/New_index1.html)
2. [http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Computer%20networks/New\\_index1.html](http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Computer%20networks/New_index1.html)
3. Computer networks, A system Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412205)BIO-INFORMATICS**

**UNIT I: INTRODUCTION:**

The Central Dogma, The Killer Application, Parallel Universes – Watson's Definition – Top Down Versus Bottom up – Information Flow , Convergence Databases , Data Management , Data Life Cycle , Database Technology , Interfaces , Implementation  
Networking: Geographical Scope, Communication Models, Transmissions Technology, Protocols, Bandwidth, Topology ,

**UNIT II: NETWORKS AND SEARCH ENGINES**

Networks: Networks, Hardware , Contents , Security , Ownership , Implementation , Management

Search Engine process: The search process, Search Engine Technology, Searching and Information Theory, Computational methods, Search Engines and Knowledge Management

**UNIT III: DATA VISUALIZATION AND STATISTICS**

Data Visualization, sequence visualization, structure visualization, Animation Versus simulation, General Purpose Technologies.

Statistic Information: Statistical concepts , Microarrays , Imperfect Data , Variability , Approximation , Interface Noise , Assumptions , Sampling and Distributions , Hypothesis Testing , Quantifying Randomness , Data Analysis , Tool selection statistics of Alignment

**UNIT IV: DATA MINING AND PATTERN MATCHING**

Clustering and Classification , Selection and Sampling , Preprocessing and Cleaning , Transformation and Reduction , Data Mining Methods , Evaluation , Visualization , Designing new queries , Pattern Recognition and Discovery , Machine Learning , Text Mining .

Pattern matching: Pair wise and Multiple sequence alignment , Local versus global alignment , Multiple sequence alignment , Computational methods , Dot Matrix and Substitution matrices , Dynamic Programming , Bayesian methods , Dynamic Programming , Progressive and Iterative strategies , Tools , Nucleotide and Polypeptide pattern matching ,

**UNIT - V: MODELING AND SIMULATION:**

Drug Discovery , components , Numeric considerations , Algorithms ,Protein structure , AbInitio Methods , Heuristic methods , Systems Biology , Tools , Collaboration and Communications , standards , Security , Intellectual property.

**REFERENCE BOOKS**

1. Bio Informatics Computing, Bryan Bergeron, PHI, 2003.
2. Introduction to Bio Informatics, Attwood, Smith, Longman, 1999.
3. Bio-Informatics, D Srinivasa Rao, Biotech.
4. Bio Informatics Computing, Bergeron, PHI
5. Bio Informatics, Managing scientific Data, Lacroix, Terence Critchlow, Elsevier
6. Bio Informatics Methods and Applications, Rastogi, Mendiratta, Rastogi, PHI



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412206)CYBER SECURITY**

**UNIT- I:**

**Introduction to Cybercrime:**

Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, who are Cybercriminals? Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens

**UNIT -II:**

**Cyber offenses:**

How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyberstalking, Cybercafe, Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

**UNIT -III:**

**Cybercrime Mobile and Wireless Devices:**

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

**UNIT -IV:**

**Tools and Methods Used in Cybercrime:**

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Viruses and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft)

**UNIT -V:**

Cybercrimes and Cyber security: Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The Information Security Blueprint, Security Education, Training and Awareness program, Continuing Strategies.

**TEXTBOOKS:**

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, Sunit Belapure, Wiley.
2. Principles of Information Security, Micheal E. Whitman and Herbert J. Mattord, Cengage Learning.

**REFERENCES:**

1. Information Security, Mark Rhodes, Ousley, MGH.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412207)COMPUTER COMMUNICATIONS**

**Unit I: Introduction:**

Network Hardware reference model – Transmission media – Narrowband ISDN – Broad band ISDN – ATM.

**Unit II: Data Link Layer and Channel allocation Methods:**

The data Link layer – Design Issues – Error detection and correction – Elementary Data Link Protocols – Sliding window protocols – Data link layer in HDLC, Internet and ATM. Channel allocation methods – TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision Free protocols – IEEE standard 802 for LANs – Ethernet, Token Bus, Token ring – Bridges.

**Unit III: Network Layer and internetworking:**

NETWORK LAYER Routing Algorithms – Shortest path, Flooding, Flow based Distance vector, Link state, Hierarchical, Broadcast routing, Congestion Control algorithms-General principles of congestion control, Congestion prevention policies, Choke packets and Load shedding.

Tunneling, internetworking, Fragmentation, network layer in the internet – IP protocols, IP address, Subnets, Internet control protocols, OSPF, BGP, Internet multicasting, Mobile IP. Network layer in the ATM Networks – cell formats, connection setup, routing and switching, service categories, and quality of service, ATM LANs.

**Unit IV: Transport Layer :** The Transport Layer Elements of transport protocols – addressing, establishing a connection, releasing connection, flow control and buffering and crash recovery, END TO END PROTOCOLS – UDP, reliable Byte Stream (TCP) end to end format, segment format, connection establishment and termination, sliding window revisited, adaptive retransmission, TCP extension, Remote Procedure Call – BLAST, CHAN, SELECT, DCE.

**Unit V: Application Layer :** Application Layer – Network Security – Cryptographic Algorithms – DES, RSA. Security Mechanisms – Authentication Protocols, Firewalls, Name service (DNS) Domains Hierarchy, Name servers. Traditional Applications – SMTP, MIME, World Wide Web – HTTP, Network Management – SNMP.

**REFERENCE BOOKS**

1. COMPUTER NETWORKS, Andrew Tanenbaum, 3/e, PHI.
2. COMPUTER NETWORKS – A SYSTEM APPROACH – Larry L. Peterson, Bruce S. Davie, 2/e, Harcourt Asia PTE LTD.
3. Data Communication and Networking, 4/e, Forouzan, TMH
4. An engineering approach to computer networking, Kesav, PEA
5. Data and Computer Communications, 8/e, Stallings, PHI
6. Computer communication and networking technologies, Gallo, Hancock, Cengage
7. Understanding data communications, 7/e, Held, PEA
8. Communication Networks, 2/e, Leon-Garcia, TMH

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412208)DEEP LEARNING**

**UNIT I:**

**Basics-** Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability, Convergence theorem for Perceptron Learning Algorithm.

**UNIT II:**

**Feedforward Networks-** Multilayer Perceptron, Gradient Descent, Backpropagation, Empirical Risk Minimization, regularization, auto encoders.

**Deep Neural Networks:** Difficulty of training deep neural networks, Greedy layer-wise training.

**UNIT III:**

**Better Training of Neural Networks-** Newer optimization methods for neural networks ( Adagrad, adadelta, rms prop, adam, NAG), second order methods for training, Saddle point problem in neural networks, Regularization methods (dropout, drop connect, batch normalization).

**UNIT IV:**

**Recurrent Neural Networks-** Backpropagation through time, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs.

**Convolutional Neural Networks:** LeNet, AlexNet, Generative models: Restrictive Boltzmann Machines (RBMs), Introduction to MCMC and Gibbs Sampling, gradient computations in RBMs, Deep Boltzmann Machines.

**UNIT V:**

**Recent trends-** Variational Autoencoders, Generative Adversarial Networks, Multi-task Deep Learning, Multi-view Deep Learning

**Applications:** Vision, NLP, Speech

**Textbooks**

1. Deep Learning, Ian Good fellow and Yoshua Bengio and Aaron Courville, MIT Press, 2016.

**Reference Books:**

1. Neural Networks: A Systematic Introduction, Raúl Rojas, 1996

2. Pattern Recognition and Machine Learning, Christopher Bishop, Springer, 2007

3. Deep Learning with Python, François Chollet, Manning Publications, 2017.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412209) MACHINE LEARNING**

**UNIT I: Introduction:**

Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning

Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

**UNIT II: Decision Tree learning:**

Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Issues in decision tree learning

**UNIT III: Artificial Neural Networks:**

Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition

Advanced topics in artificial neural networks

**Evaluation Hypotheses:** Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

**UNIT IV: Bayesian learning:**

Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm

**UNIT V: Computational learning theory:**

Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces - **Instance- Based Learning**- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning **Genetic Algorithms:**

Motivation, Genetic Algorithms, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms.

**TEXTBOOK:**

1. Machine Learning, Tom M. Mitchell, MGH

**REFERENCE BOOKS:**

1. Machine Learning, An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC)
2. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412210)MOBILE COMPUTING**

**Unit 1: Introduction to Mobile Communications and Computing:**

Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture  
GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

**(Wireless) Medium Access Control:**

Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

**Unit II: 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).

**Mobile Ad hoc Networks (MANETs):**

Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs

**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: 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.

**REFERENCE BOOKS:**

1. Mobile Communications, 2/e, Jochen Schiller, 2004, *Addison-Wesley*.
2. Handbook of Wireless Networks and Mobile Computing, Stojmenovic, Cacute, Wiley, 2002
3. Mobile Computing Principles, Designing and Developing Mobile Applications with UML and XML, Reza Behravanfar, Cambridge, University Press, 2004.
4. Fundamentals of Mobile and Pervasive Computing, Adelstein, Frank, Gupta, Sandeep KS. Richard Golden, Schwiebert, Loren, TMH, 2005.
5. Principles of Mobile Computing, 2/e, Hansmann, Merk, Nicklous, Stober, *Springer*, 2003.
6. Mobile and Wireless Design Essentials, Martyn Mallick, Wiley *DreamTech*, 2003
7. Mobile Computing, Rajkamal, Oxford, 2008
8. Adhoc Wireless Networks, 2/e, Sivaram murthy, manoj, PEA, 2009

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412211)PARALLEL COMPUTING & ALGORITHMS**

**UNIT I: Introduction:**

Computational demand in various application areas, advent of parallel processing, terminology-pipelining, Data parallelism and control parallelism-Amdahl's law. Basic parallel random access Machine Algorithms-definitions of P, NP and NP-Hard, NP-complete classes of sequential algorithms-NC –class for parallel algorithms.

**UNIT II:**

Organizational features of Processor Arrays, Multi processors and multicomputers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm

**UNIT III:**

Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms.

**UNIT IV:**

Matrix Multiplication algorithms on SIMD and MIMD models  
Fast Fourier Transform algorithms. Implementation on Hyper cube architectures

**UNIT V:**

Parallel sorting methods---Odd-even transposition Sorting on processor arrays. Biontic – merge sort on shuffle –exchange ID –Array processor, 2D-Mesh processor and Hypercube Processor Array  
Parallel Quick-sort on Multi processors. Hyper Quick sort on hypercube multi computers. Parallel search operations.

**REFERENCE BOOKS:**

1. Parallel computing theory and practice, MICHAEL J.QUINN
2. Programming Parallel Algorithms, Guy E. Blelloch, Communications of the ACM
3. Algorithms for Parallel processing, Michael T Heath, Abhiram Ranade, Schreiber(Ed), Springer.
4. Handbook of Parallel Computing Models, algorithms and applications, Samgithevar Rajasekharan, John Reif(Ed), Taylor and Francis group.
5. Parallel Processing and Parallel Algorithms: Theory and Computation, Seyed H. Roosta, Springer

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412212)PATTERN RECOGNITION**

**UNIT I : Introduction:**

Fundamental problems in pattern Recognition system design, Design concepts and methodologies, Simple pattern recognition model.

**Decisions and Distance Functions:**

Linear and generalized decision functions, Pattern space and weight space, Geometrical properties, implementations of decision functions, Minimum-distance pattern classifications.

**Probability - Probability of events:**

Random variables, Joint distributions and densities, Movements of random variables, Estimation of parameter from samples.

**UNIT - II: DECISION MAKING** - Baye's theorem, Multiple features, Conditionally independent features, Decision boundaries, Unequal cost of error, estimation of error rates, the leaving-one-out-techniques, characteristic curves, estimating the composition of populations. Baye's classifier for normal patterns.

**Non Parametric Decision Making:**

histogram, kernel and window estimation, nearest neighbour classification techniques. Adaptive decision boundaries, adaptive discriminant functions, Minimum squared error discriminant functions, choosing a decision making techniques.

**UNIT III: Clustering and Partitioning:**

Hierarchical Clustering: Introduction, agglomerative clustering algorithm, the single-linkage, complete-linkage and average-linkage algorithm. Ward's method Partition clustering-Forg's algorithm, K-means's algorithm, Isodata algorithm.

**UNIT IV: Pattern Preprocessing and Feature selection:**

distance measures, clustering transformation and feature ordering, clustering in feature selection through entropy minimization, features selection through orthogonal expansion, binary feature selection.

**UNIT V: Syntactic Pattern Recognition and Application of Pattern Recognition:**

Concepts from formal language theory, formulation of syntactic pattern recognition problem, syntactic pattern description, recognition grammars, automata as pattern recognizers, Application of pattern recognition techniques in bio-metric, facial recognition, IRIS scan, Finger prints, etc.,

**REFERENCES BOOKS:**

1. Pattern recognition and Image Analysis, Gose. Johnsonbaugh Jost, PHI.
2. Pattern Recognition Principle, Tou. Rafael. Gonzalez, Pea.
3. Pattern Classification, Richard Duda, Hart., David Stork, Wiley.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412213)SCALABLE PARALLEL COMPUTING ARCHITECTURES**

**Unit I: Parallel Computer Models, Program and Network Properties:** Parallel Computer Models: Multiprocessors and Multicomputer, Multivector and SIMD Computers, PRAM and VLSI Models, Architectural Development Tracks

**Program and Network Properties:** Conditions of Parallelism, Program Partitioning and Scheduling, Program Flow Mechanisms, System Interconnect Architectures.

**Unit II: Principles of Scalable Performance, Parallel Models, Languages and Compilers**  
: Principles of Scalable Performance: Performance Metrics and Measures, Parallel Processing Applications, Speedup Performance Laws, Scalability Analysis and Approaches.

**Parallel Models, Languages and Compilers:** Parallel Programming Models, Parallel Languages and Compilers, Dependence Analysis of Data Arrays, Code Optimization and Scheduling, Loop Parallelization and Pipelining.

**Unit III: Processors and Memory Hierarchy:** Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology.

**Bus, Cache, and Shared Memory:** Backplane Bus Systems, Cache Memory Organizations, Shared-Memory Organizations, Sequential and Weak Consistency Models.

**Unit IV: Pipelining and Superscalar Techniques:**

Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design, Superscalar and Super pipeline Design

**Unit V: Multiprocessors and Multicomputers:**

Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Three Generations of Multicomputers, Message-Passing Mechanisms.

**Multivector and SIMD Computers:** Vector Processing Principles, Multivector Multiprocessors, Compound Vector Processing, SIMD Computer Organizations: BSP and CM2 Architectures, The Connection Machine CM-5: CM5 Architecture and Inter process communication.

**REFERENCE BOOKS:**

1. Advanced computer Architecture, Parallelism, Scalability, Programmability. Kai Hwang, TMH
2. Computer Architecture, A quantitative approach, 4/e, John L. Hennessy, David A. Patterson, Morgan Kaufmann / Elsevier, 2007.
3. Parallel Computing Architecture, A hardware/ software approach, David E. Culler, Jaswinder Pal Singh, Morgan Kaufmann / Elsevier, 1997.
4. Computer Organization and Architecture, Designing for Performance, 7/e, William Stallings, Pearson, 2006.
5. Computer Organization and Design, 4/e, Patterson, Hennessy Elsevier India, 2008.
6. Computer Architecture & Parallel Processing, Kai Hwang, Faye A. Briggs, TMH.
7. Parallel programming, 2/e, Wilkinson, Allen, Pea.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412214) SECURED DATABASE APPLICATIONS DEVELOPMENT**

**Unit I: Security Architecture:**

Introduction, Security, Information Systems, Database management systems, Information security, Information security Architecture, database security, Asset types and their value, Security methods.

**Operating System Security Fundamentals:**

Introduction, operating systems overview, security environment, components, Authentication methods, user administration, password policies, Vulnerabilities of operating systems, E-Mail security.

**Unit II: Administration of Users :**

Introduction, user authentication, operating system authentication, creating/removing/modifying users, default/remote users, Database links, Linked servers, remote servers.

**Profiles, Password Policies, Privileges, and Roles:** Introduction, Defining and using profiles, Designing and implementing password policies, Granting and revoking user privileges, creating, Assigning and revoking user roles.

**Unit III: Database Application Security Models :**

Introduction, Types of users, security models, application types, application security models and Data encryption.

**Unit IV: Virtual Private Databases (VPD):**

Introduction, Overview, implementing a VPD using views and application context. Implementing oracle VPD, Viewing VPD policies and application context using: data dictionary, policy manager, implementing row and column level security with SQL server.

**Unit V: Database Auditing Models, Application Data Auditing:**

Database Auditing Models: Introduction, Auditing overview, environment, process, objectives, classification and types, benefits and side effects of auditing.

Application Data Auditing: Introduction, DML auction auditing architecture. Triggers, fine grained auditing, DML statement audit trail and auditing application errors with Oracle.

**REFERENCE BOOKS:**

1. Database Security and Auditing, Hassan Afyouni, Cengage Learning, 2007
2. Database Security, S. Castano, M. Fugini, G. Martella, P. Samarati, Addison-Wesley, 1994
3. Implementing Database Security and Auditing, RonBen Natan: Elsevier, Indian reprint, 2006
4. Principles of Distributed Database Systems, Prentice Hall, 2/e, M.Tamer Özsu, Patrick Valduriez
5. Database Security, Castano, Fugini, Addison Wesley
6. The security Audit and control of Databases, Clark, Holloway, List, UK: Ashgate.
7. Security and Audit of Database System, Douglas, Blackwell(UK)
8. Database security and Integrity, Fernandez, Summers, Wood, Addison Wesley

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**Syllabus for Pre-Ph. D Examination**  
**INFORMATION TECHNOLOGY**

**(PH2412215) WIRELESS NETWORKS AND MOBILE COMPUTING**

**UNIT I : INTRODUCTION TO MOBILE AND WIRELESS LANDSCAPE:** Definition of Mobile and Wireless, Components of Wireless Environment, Challenges, Overview of Wireless Networks, Categories of Wireless Networks, Wireless LAN : Infra red Vs radio transmission, Infrastructure and Ad-hoc Network, IEEE 802.11, HIPERLAN, Bluetooth.

**UNIT III: MOBILE NETWORK LAYER & TRANSPORT LAYER: MOBILE NETWORK LAYER:** Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunnelling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP), Mobile Ad-hoc networks : Routing, destination Sequence Distance Vector, Dynamic Source Routing.  
**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 III: GSM: GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS (GSM):** GSM Architecture, GSM Entities, Call Routing in GSM, PLMN Interfaces, GSM Addresses and Identifiers, Network Aspects in GSM, GSM Frequency Allocation, Authentication and Security.

**UNIT IV : 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.

**UNIT - V: WIRELESS LANGUAGE AND CONTENT – GENERATION TECHNOLOGIES: WIRELESS LANGUAGE AND CONTENT – GENERATION TECHNOLOGIES:** Wireless Content Types, Markup Languages: HDML, WML, HTML, cHTML, XHTML, VoiceXML.  
**Content- Generation Technologies:** CGI with Perl, Java Servlets, Java Server Pages, Active Server Pages, XML with XSL Stylesheets, XML Document, XSL Stylesheet  
**MOBILE AND WIRELESS SECURITY:** Creating a Secure Environment, Security Threats, Security Technologies, Other Security Measures, WAP Security, Smart Client Security

**REFERENCE BOOKS:**

1. Mobile Communications, 2/e, Jochen Schiller, PEA, 2008.
2. Mobile and Wireless Design Essentials, Martyn Mallick, Wiley, 2008.
3. Mobile Computing, Asoke K Talukder, et al., MGH, 2008.
4. Mobile Computing, Raj Kamal, Oxford .
5. Wireless Communications & Networks, 2/e, William Stallings, PEA, 2007.
6. Fundamentals of Mobile and Pervasive Computing, Frank Adelstein et al, TMH, 2005.
7. Wireless Networks first-step, Jim Geier, PEA, 2005.
8. 2.5G Mobile Networks: GPRS and EDGE, Sumit Kasera et al, TMH, 2008.
9. 802.11 Wireless Networks, 2/e, Matthew S. Gast, O'Reilly, 2006.
10. Handbook of Wireless Networks and Mobile Computing, Ivan Stojmenovic , Wiley, 2007.