

**NATIONAL INSTITUTE OF TECHNOLOGY NAGALAND
CHUMUKEDIMA, DIMAPUR – 797 103.**

**B.Tech Degree Programme
Curriculum**

Regulations – 2012

Bachelor of Technology in Computer Science and Engineering

Semester III

Course Code	Course Title	L	T	P	C
MA202	Discrete Mathematics	3	1	0	4
CS201	Data Structures	3	0	0	3
CS202	Computer Architecture	3	0	0	3
CS203	Database Management Systems	3	0	0	3
EE208	Electrical Science	3	0	2	4
CS204	Programming Paradigms	3	0	0	3
CS205	Data Structures Laboratory	0	0	3	2
CS206	Advanced Programming Laboratory	0	0	3	2
CS207	Database Management Systems Laboratory	0	0	3	2
TOTAL		18	1	11	26

PROPOSITIONAL CALCULUS 12

Propositions – Logical Connectives – Compound Propositions – Conditional and Biconditional Propositions – Truth Tables – Tautologies and Contradictions – Contrapositive – Logical Equivalences and Implications – Demorgan’s Laws – Normal Forms – Principal Conjunctive and Disjunctive Normal Forms – Rules of Inference – Arguments – Validity of Arguments

PREDICATE CALCULUS 12

Predicates – Statement Function – Variables – Free and Bound Variables – Quantifiers – Universe of Discourse – Logical Equivalences and Implications for Quantified Statements – Theory of Inference – The Rules of Universal Specification and Generalization – Validity of Arguments

SET THEORY 12

Basic Concepts – Notations – Subset – Algebra of Sets – The Power Set – Ordered Pairs and Cartesian Product – Relations on Sets – Types of Relations and their Properties – Relational Matrix and the Graph of a Relation – Partitions – Equivalence Relations – Partial Ordering – Poset – Hasse Diagram – Lattices and their Properties – Sublattices – Boolean Algebra – Homomorphism

FUNCTIONS 12

Definition of functions – Classification of Functions – Type of Functions – Examples – Composition of Functions – Inverse functions – Binary and n-ary Operations – Characteristic Function of a Set – Hashing Functions – Recursive Functions – Permutation Functions

GROUPS 12

Algebraic Systems – Definitions – Examples – Properties – Semigroups – Monoids – Homomorphism – Sub Semigroups and Submonoids – Cosets and Lagrange’s Theorem – Normal Subgroups – Normal Algebraic System with two Binary Operations – Codes and Group Codes – Basic Notions of Error Correction – Error Recovery in Group Codes

Total: 60 Periods

TEXT BOOKS

1. Trembly J .P and Manohar R, “Discrete Mathematical Structures with Applications to Computer Science”, TMH Pub. Co. Ltd, New Delhi, 2003.
2. Ralph P. Grimaldi, “Discrete and Combinatorial Mathematics: An Applied Introduction”, Fourth Edition, Pearson Education Asia, Delhi, 2002.

REFERENCES

1. Bernard Kolman, Robert C. Busby and Sharan Cutler Ross, “Discrete Mathematical Structures”, Fourth Indian reprint, Pearson Education Pvt Ltd., New Delhi, 2003.
2. Kenneth H. Rosen, “Discrete Mathematics and its Applications”, Fifth Edition, TMH Pub. Co. Ltd., New Delhi, 2003.
3. Richard Johnsonbaugh, “Discrete Mathematics”, Fifth Edition, Pearson Education Asia, New Delhi, 2002.

CS201 DATA STRUCTURES**L T P C****3 0 0 3****LINEAR DATA STRUCTURES****9**

Abstract Data Types – Algorithm Notations - Basic data structures – Arrays – Lists – Singly linked lists – Doubly linked lists – Circular lists - Stacks and Queues – Applications of Stack and Queues

NON-LINEAR DATA STRUCTURES**9**

Trees – Binary Trees – Binary tree representation and traversals – Threaded binary trees – Binary tree representation of general trees – Application of trees: Set representation – Graph and its representations – Graph Traversals

SEARCH TREES AND PRIORITY QUEUES**9**

AVL Trees – Red-Black Trees – Splay Trees – Binary Heap – Leftist Heap

SORTING**9**

Insertion sort – Merge sort – Quick sort – Heap sort – Sorting with disks – K-way Merging – Sorting with Tapes – Polyphase Merge

SEARCHING AND INDEXING**9**

Linear Search – Binary Search - Hash Tables – Overflow Handling – Cylinder Surface Indexing – Hash Index – B-Tree Indexing.

Total: 45 Periods**TEXT BOOKS**

1. Ellis Horowitz and Sartaj Sahni, “Fundamentals of Data Structures”, Computer Press, 1983.
2. Sartaj Sahni, “Data Structures, Algorithms, and Applications in C++”, Second Edition, McGraw Hill NY, Silicon Press, 2005.

REFERENCE BOOKS

1. Goodrich, Michael T., Roberto Tamassia, David Mount. "Data Structures and Algorithms in C++", Seventh Edition, Wiley Publishers, 2004.
2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 3rd edition, Pearson Education India, 2007.
3. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications, Second Edition, Tata McGraw-Hill, New Delhi, 1991.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Third Edition, Prentice Hall of India, , 2010.

CS202 COMPUTER ARCHITECTURE

L T P C

3 0 0 3

FUNDAMENTAL STRUCTURE OF COMPUTERS

9

Functional units – Basic operational concepts – Bus structures – Software Performance – Memory Locations and Addresses – Memory Operations – Instruction and Instruction Sequencing – Addressing Modes – Flynn’s Classification of Computers (SISD, MISD, MIMD) – RISC – CISC – ALU Design – Fixed and Floating Point Operations

ARITHMETIC FOR COMPUTERS

9

Addition and Subtraction – Fast Adders – Binary Multiplication – Binary Division – Floating Point Numbers – Representation – Arithmetic Operators

BASIC PROCESSING UNIT

9

Fundamental Concepts – Multiple Bus Organization – Execution of Complete Instruction – Hardwired Control – Micro Programmed Control – Instruction Level Parallelism

PIPELINING AND ILP

9

Basic Concepts – Data Hazards – Instruction Hazards – Influence on Instruction Sets – Data Path and Control Considerations – Performance Considerations – Exception Handling – Advanced Concepts in Pipelining – Exploitation of more ILP – Hardware and Software Approaches – Dynamic Scheduling – Speculation – Compiler Approaches – Multiple Issue Processors

MEMORY SYSTEM AND I/O

9

Basic Concepts – Semiconductor RAM – ROM – Speed – Size and Cost – Cache Memories – Improving Cache Performance – Virtual Memory – Memory Management requirements – Associative Memories – Secondary Storage Devices – Accessing I/O Device – Interrupts – DMA – Buses – Interface Circuits – Standard I/O Interfaces (PCI, SCSI, USB) – I/O Devices and Processors

Total: 45 Periods

TEXT BOOKS

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, Fifth Edition, Tata McGraw Hill, 2002.
2. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/Software Interface”, Third Edition, Elsevier, 2005.

REFERENCE BOOKS

1. William Stallings, “Computer Organization and Architecture: Designing for Performance”, Sixth Edition, Pearson Education, 2003.
2. John P. Hayes, “Computer Architecture and Organization”, Third Edition, Tata McGraw Hill, 1998.
3. V.P. Heuring, H.F. Jordan, “Computer Systems Design and Architecture”, Second Edition, Pearson Education, 2004.
4. Behrooz Parhami, “Computer Architecture”, Oxford University Press, 2007.

CS203 DATABASE MANAGEMENT SYSTEMS

L T P C

3 0 0 3

DATABASE FUNDAMENTALS

9

Introduction and Need for Database Systems – Database Vs File systems – Database – DBMS distinction – Approaches to build a Database – Database System Architecture – Data Modeling and Languages – Entity-Relationship Model – Weak Entity Sets – Mapping ER Model to Relational Model

RELATIONAL DATA MODEL

9

Concept of Relations – Schema-Instance distinction – Integrity Constraints – Relational Algebra – Tuple Relation Calculus – Domain Relational Calculus – Overview of QBE – SQL Queries – Nested Queries – Aggregate Operators – Null values – Embedded SQL – Database Security – Views

DATABASE DESIGN

9

Importance of a Good Schema Design – Problems encountered with Bad Schema Designs – Functional Dependencies – Normalization – Decomposition – Armstrong's Axioms – First, Second, Third Normal Forms – Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

DATA STORAGE AND INDEXES

9

File Organizations – Primary and Secondary Index Structure – Various Index Structures – Hash-based – Dynamic Hashing Techniques – Multi-level Indexes – B Trees – B⁺ Trees

TRANSACTION PROCESSING AND ADVANCED CONCEPTS

9

Transaction Concepts – ACID Properties – Recovery and Concurrency Control – Locking Protocols – Recovery Methods – Object Oriented and Object Relational Databases – Logical Databases – Web Databases – Distributed Databases – Data Warehousing and Data Mining

Total: 45 Periods

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006.
2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson / Addison Wesley, 2007.

REFERENCE BOOKS

1. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, Tata McGraw Hill, 2003.
2. S.K.Singh, “Database Systems Concepts, Design and Applications”, First Edition, Pearson Education, 2006.
3. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.

BASIC CIRCUIT CONCEPTS**9**

Lumped circuits – Circuits elements – V-I relationships of R, L and C – Independent sources – Dependent sources – simple resistive circuits – Kirchoff's Laws – Analysis of series and parallel circuits – Network reduction – Voltage division – Current division – Source transformation – Star delta transformation.

SINUSOIDAL STEADY STATE ANALYSIS**9**

Concepts of phasor and complex impedance and admittance – Analysis of simple series and parallel circuits – Active power, Reactive power and Power factor – Series resonance and parallel resonance – Bandwidth and Q factor – Solution of three phase balanced circuits – Power measurement by two-wattmeter method – Solution of three phase unbalanced circuits.

MAGNETIC CIRCUITS**9**

Self and Mutual Inductances – Leakage Reactance - Magnetic circuits with DC and AC excitation - Components of Exciting Current - B-H curve - Hysteresis and Eddy Currents and losses - Separation of Hysteresis and eddy current losses - Dynamic B-H curve - Determination of Magnetic Force and Torque from Energy and Co-energy – Single and Multiple Excited Systems - Simple designs

INTRODUCTION TO ROTATING MACHINES**9**

Introduction to AC and DC machines – MMF of distributed windings – Magnetic fields in rotating machines – Rotating MMF in AC machines – Generated voltage in AC and DC machines – Electro-magnetic Torque in Non-Salient pole machines – Linear machines – Magnetic saturation – Flux Leakages

DC MACHINES AND TRANSFORMERS**9**

Electromagnetic Torque and Generated Voltage in a DC Machine - Effect of Armature MMF – Electric Circuit Aspects – Magnetic Circuit Aspects – Testing of Machines - Transformers : Principle of operation – EMF Equation – No load Conditions – Effect of Secondary Current – Equivalent Circuit – Phasor Diagrams – Open Circuit, Short Circuit, Load, Sumpner's Tests – Separation of No load Losses – Voltage regulation and efficiency

Total: 45 Periods

TEXT BOOKS

1. M. Nahvi and J.A. Edminister, "Electric Circuits", Fifth Edition, Schaum's Outline Series, McGraw-Hill, 2011
2. W H Hayt, J E Kemmerly, S M. Durbin "Engineering Circuit Analysis", Seventh Edition, Tata McGraw-Hill, International Editions, 2010
3. A Fitzgerald, Charles Kingsley, Stephen Umans, "Electric Machinery", 6th Edition, Tata McGraw Hill, 2010

REFERENCE BOOKS

1. Donald Fink and H. Wayne Beaty "Standard Handbook for Electrical Engineers", Tata Mc-Graw Hill, 2006.
2. Van Vallenburg, "Network Analysis", Prentice Hall India.
3. Nilsson and Riedel, "Electric Circuits", Ninth Edition, Pearson Education, 2011.
4. Vincent Del Toro, "Electrical Engineering Fundamentals", Prentice Hall India
5. Cotton, H., "Electrical Technology", CBS Publishers, New Delhi, 6th edition 1984

CS204 PROGRAMMING PARADIGMS

L T P C

3 0 0 3

OBJECT ORIENTED PARADIGM

9

Object Oriented Programming Concepts – Classes – Objects – Methods and Messages – Abstraction and Encapsulation – Inheritance – Abstract Classes – Polymorphism – C++ Fundamentals – I/O operations – Constructors – Destructors – Pointers – String handling – Function Overloading – Operator Overloading

INHERITANCE AND POLYMORPHISM

9

Inheritance – Public, Private and Protected Derivations – Multiple Inheritance – Virtual Base Class – Abstract Class – Virtual Functions – Pure Virtual Functions – Templates

JAVA FUNDAMENTALS

9

Java Virtual Machine – Reflection – I/O Streaming – Filter And Pipe Streams – Byte Codes – Byte Code Interpretation – Dynamic Reflexive Classes – Threading – Java Native Interfaces – GUI Applications

NETWORK PROGRAMMING IN JAVA

9

Socket Programming - Stream Customization – Secure Sockets – Custom Sockets – UDP Datagrams – Multicast Sockets – URL Classes – Reading Data from the Server – Writing Data – Configuring The Connection – Reading The Header – Content Handlers – Telnet Application – Java Messaging Services – Remote Method Invocation – Activation Models – JAR File Creation – JDBC –Multimedia Data Handling

WEB PROGRAMMING ELEMENTS

9

Browser configuration – Plug-in components – Web standards and validation – Web Quality – XML standards – HTML – CSS – DHTML – Java Script – Functions – Events – Document Object Model

Total: 45 Periods

TEXT BOOKS

1. Bjarne Stroustrup, "The C++ Programming Language", Third Edition, Pearson Education, 2000.
2. Cay S. Horstmann, Gary Cornell, "Core JAVA Volume 1", Eighth Edition, Pearson Education, 2008.
3. P.J. Deitel and H.M. Deitel, "Internet & World Wide Web: How to Program", Fourth Edition, Pearson Education, 2009.

REFERENCE BOOKS

1. S. B. Lippman, Josee Lajoie, Barbara E. Moo, "C++ Premier", Fourth Edition, Pearson Education, 2005.
2. Robert Lafore, "Object Oriented Programming in C++", Fourth Edition, Sams Publishers, 2001.
3. K. Arnold and J. Gosling, "The JAVA programming language", Third Edition, Pearson Education, 2000.
4. Robert W. Sebesta, "Programming the World Wide Web", Sixth Edition, Addison-Wesley, 2010.

CS205 DATA STRUCTURES LABORATORY

L T P C

0 0 3 2

1. Implementation of Abstract Data Type – Lists – Array based - Linked List – adding, inserting, deleting and sorting
2. Application of Lists – Polynomial Manipulation
3. Implementation of Stack ADT – Evaluating Arithmetic Expressions – Convert Infix expression to Postfix expression
4. Implementation of Queue ADT – Circular Queue and Double ended Queue
5. Priority Queue using Heaps
6. Implementation of Trees – Binary Trees – Tree Traversals
7. Application of Trees – Hashing – Hash Functions – Rehashing – Extendible Hashing
8. Insertion sort – Shell sort – Bubble sort – Heap sort – Quick sort – Merge Sort
9. Linear Search and Binary Search Techniques
10. Implementation of AVL Trees
11. Implementation of B Trees and B⁺ Trees
12. Implementation of Binomial Heaps and Fibonacci Heaps
13. Representation of Graphs – Breadth-first Search – Depth-first Search
14. Implementation of Kruskal's, Prim's, Sollin's Algorithm

1. Simple C++ programs to understand the concepts of user defined types (classes) and predefined objects.
2. Implementation of String class in C++ (length, reverse, uppercase and lowercase, copy operations)
3. Implementation of C++ application to demonstrate explicit handling of this pointer, copy constructor, constant members in a class, static member functions and function pointers for member functions
4. C++ applications for overloading operators and functions (applications such as representation of complex numbers, simplification of fractional expressions etc.,)
5. C++ applications for demonstrating compile time and run time polymorphism
6. Implementation of class and function templates in C++.
7. Implementation of Multi-level Inheritance in C++.
8. Simple Java applications to demonstrate default inheritance, pre-defined classes and packages
9. Implementation of Java applications to demonstrate reflection for method invocation
10. Simple Java applications using Threads and Simple Networking applications using Sockets
11. Implement multi-threaded echo server and a corresponding GUI client using sockets in Java.
12. Develop a RMI application to call a remote method to retrieve a video content.
13. Develop a java application to the retrieve the student's records from the database.
14. Design a simple Web page using DHTML and CSS.
15. Design a student course registration form with appropriate validation. Use DOM objects and Java Script.

1. Experiment with SQL basics and commands
 - Understanding Database Schema and Table Definition
 - Create a Database, ALTER TABLE, Updating the Table, Dropping a Table
 - Data Definition Language commands
 - Data Manipulation Language and transaction control commands
 - Adding, inserting, editing and deleting records in the database, generating SQL Queries and Sub Queries, Retrieval of data, Printing of data with user defined headings

2. Advanced Queries
 - Modifying the Structure of Tables,
 - Use of logical operators, BETWEEN AND, IN Function, LIKE operator in queries
 - Implement the concept of JOINS with Single Table and Multi Tables
 - Use of built-in functions, ordering and CONCAT operations, AGGREGATE and GROUPING functions, SET operations

3. Understanding E-R diagrams, entities, relationships and mapping constraints

4. Implement the concept of Indexes and Views

5. Experiment with Normalization

6. Database Connectivity with front end tools and Embedded SQLs

7. Use of Forms and Reports Generation

8. Use of Control Structures, Procedures, Functions and View in PL/SQL

9. Implement Triggers and Cursors

10. Experiment on Networked Databases

11. Study of Database Administration

12. Database Design and Implementation (Case Study)

**NATIONAL INSTITUTE OF TECHNOLOGY NAGALAND
CHUMUKEDIMA, DIMAPUR – 797 103.**

**B.Tech Degree Programme
Curriculum**

Regulations – 2012

Bachelor of Technology in Computer Science and Engineering

Semester V

Course Code	Course Title	L	T	P	C
CS301	Computer Graphics	3	0	0	3
CS302	Digital Signal Processing Fundamentals	3	0	0	3
CS303	Formal Languages and Automata Theory	3	0	0	3
CS304	Computer Networks	3	0	0	3
CS903	Data Mining and Data Warehousing	3	0	0	3
CS910	XML and Web Services	3	0	0	3
CS305	Computer Graphics Laboratory	0	0	3	2
CS306	Digital Signal Processing Laboratory	0	0	3	2
CS307	Computer Networks Laboratory	0	0	3	2
TOTAL		18	0	9	24

CS301 COMPUTER GRAPHICS

L T P C

3 0 0 3

2D PRIMITIVES

9

Coordinate Systems - Elements of pictures created in computer graphics – Graphics input primitives and devices – OpenGL basic Graphics primitives – Output primitives – Line, Circle and Ellipse drawing algorithms – Attributes of output primitives – Line drawings in OpenGL – Display Technologies

2D GEOMETRIC TRANSFORMATIONS

9

2D Viewing – Window-Viewport Transformation – Two dimensional Geometric transformations – Line, Polygon, Curve and Text clipping algorithms – 2D Geometric Transformations using OpenGL

3D GRAPHICS

9

Parallel and Perspective projections – Three dimensional object representation – Polygons, Curved lines, Splines, Quadric Surfaces – Visualization of data sets – 3D Transformations – Viewing – Visible surface identification – Color Models – Graphics Programming

MULTIMEDIA BASICS

9

Introduction and Definitions – Applications – Elements – Animations – Compression – Types of Compressions: Lossless – Lossy – Video compression – Image Compression – Audio compression – Media Representation and File format – Multimedia data structures: KD Trees – R trees

MULTIMEDIA AUTHORIZING AND APPLICATIONS

9

Creating interactive multimedia – Multimedia Authoring Systems – Video on Demand – Virtual Reality – Augmented Reality – Content based retrieval – Multimedia for portable devices

Total: 45 Periods

TEXT BOOKS

1. Donald D. Hearn, M. Pauline Baker and Warren Carithers, “Computer Graphics with OpenGL”, Fourth Edition, Pearson Education, 2010.

2. Ze-Nian Li and Mark S.Drew, “Fundamentals of Multimedia”, First Edition, Pearson Education, 2007.

REFERENCE BOOKS

1. F.S.Hill and Stephen M Kelley, “Computer Graphics using OPENGL”, Third Edition, Prentice Hall, 2007.
2. Prabhat K Andleigh, Kiran Thakrar, “Multimedia Systems Design”, First Edition, PHI, 2007.
3. Ralf Steinmetz and Klara, “Multimedia Computing, Communications and Applications”, Pearson Education, 2004.
4. Peter Shirley, “Fundamentals of Computer Graphics”, Third Edition, A K Peters, 2009.

TEXT BOOKS

1. J.G. Proakis and D.G. Manolakis, 'Digital Signal Processing Principles, Algorithms and Applications', Pearson Education, New Delhi, 2009.
2. S.K. Mitra, 'Digital Signal Processing – A Computer Based Approach', Tata McGraw Hill, New Delhi, 2006.

REFERENCES

1. Alan V. Oppenheim, Ronald W. Schaffer and John R. Buck, 'Discrete – Time Signal Processing', Pearson Education, New Delhi, 2003.
2. Emmanuel C Ifeachor and Barrie W Jervis , "Digital Signal Processing – A Practical approach" Pearson Education, Second edition, 2002.
3. B. Venkataramani, M. Bhaskar, 'Digital Signal Processors, Architecture, Programming and Applications', Tata McGraw Hill, New Delhi, 2003.
4. S.Salivahanan, A.Vallavaraj, C.Gnanapriya, "Digital Signal Processing", Tata McGraw-Hill Publishing, 2000.

TEXT BOOKS

1. E.Hopcroft and J.D.Ullman, "Introduction to Automata Theory", Languages and Computation, Second Edition, Pearson Education, 2003.
2. Peter Linz, "An Introduction to Formal Language and Automata", Narosa Pub. House, Reprint 2000.

REFERENCE BOOKS

1. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.
2. J. Martin, "Introduction to Languages and the Theory of Computation", Third Edition, Tata Mc Graw Hill, 2003.
3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

CS304 COMPUTER NETWORKS

L T P C
3 0 0 3

INTRODUCTION

9

Layering and protocols – Internet Architecture – Networking devices – Modems, Routers, Switches, Gateways – Needs – Data Communication concepts – Data Transmission – Transmission media – Signal encoding techniques – Multiplexing – Spread spectrum and Channel access techniques – TDM – FDM

DATA LINK LAYER AND LAN

9

Link layer services – Framing – Error control – Flow control – Media access control – Ethernet – CSMA/CD – Token Ring – FDDI – Wireless LANs – CSMA/CA

NETWORK ROUTING

9

Circuit switching – Packet switching – Virtual circuit switching – Routing – IP – Global Address – Datagram Forwarding – Subnetting – CIDR – ARP – DHCP – RIP – OSPF – BGP – ICMP – IPv6 – Multicasting – PIM

TRANSPORT LAYER

9

Overview of Transport layer – UDP – TCP – Reliable byte stream – Connection management – Flow control – Retransmission – Congestion control – Congestion avoidance

APPLICATION LAYER

9

Principles of Application Layer Protocols – Web and HTTP – FTP – Telnet – Electronic Mail (SMTP, POP3, IMAP, MIME) – DNS – SNMP

Total: 45 Periods

TEXT BOOKS

1. William Stallings, “Data and Computer Communications”, Ninth Edition, Pearson Education, 2010.
2. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2010.

REFERENCE BOOKS

1. Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, Pearson Education, 2003.
2. James F. Kurose, Keith W. Ross, "Computer Networking - A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.
3. Nader. F. Mir, "Computer and Communication Networks", Pearson Prentice Hall Publishers, 2010.

CS903 DATA WAREHOUSING AND DATA MINING

L T P C
3 0 0 3

INTRODUCTION TO DATA WAREHOUSING 9

Evolution of Decision Support Systems - Data warehousing Components – Building a Data warehouse - Data Warehouse and DBMS Data Marts - Metadata - Multidimensional Data Model - OLAP Vs OLTP - OLAP operations - Data Cubes - Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations

DATA WAREHOUSE PROCESS AND ARCHITECTURE 9

Types of OLAP Servers, 3-Tier Data Warehouse Architecture - Distributed And Virtual Data Warehouses - Data Warehouse Implementation, Tuning and Testing of Data Warehouse - Data Staging (ETL) Design and Development - Data Warehouse Visualization - Data Warehouse Deployment, Maintenance, Growth - Business Intelligence Overview- Data Warehousing and Business Intelligence Trends - Business Applications - Tools - SAS

INTRODUCTION TO DATA MINING 9

KDD Vs. Data Mining - Stages of the Data Mining Process - Task primitives - Data Mining Techniques - Data Mining Knowledge Representation – Data Mining Query Languages - Integration of a Data Mining System with a Data Warehouse – Issues: Data preprocessing – Data cleaning - Data transformation - Feature selection - Dimensionality reduction - Discretization - Mining Frequent Patterns - Association - Correlation

CLASSIFICATION AND CLUSTERING 9

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Clustering - Partitioning methods - k-means - Hierarchical Methods - distance-based agglomerative and divisible clustering - Density-based Methods – expectation maximization - Grid Based Methods – Model-Based Clustering Methods – Constraint-based Cluster Analysis – Outlier Analysis

DATA MINING SOFTWARE AND APPLICATIONS 9

Mining complex data objects - Spatial Databases - Temporal Databases - Multimedia Databases - Time series and Sequence data; Text Mining – Graph Mining - Web Mining - Application and trends in Data Mining

TOTAL: 45 PERIODS

TEXT BOOKS

1. Jiawei Han and Micheline Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufmann Publishers, third edition, 2011, ISBN: 1558604898.
2. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw-Hill Edition, Tenth Reprint 2007.
3. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.

REFERENCE BOOKS

1. Mehmed Kantardzic, "Data Mining Concepts, Models, Methods and Algorithms", Wiley Interscience, 2003.
2. Ian Witten, Eibe Frank, "Data Mining; Practical Machine Learning Tools and Techniques", third edition, Morgan Kaufmann, 2011.
3. George M Marakas, "Modern Data Warehousing, Mining and Visualization", Prentice Hall, 2003.

CS910 XML AND WEB SERVICES

L T P C

3 0 0 3

XML Fundamentals 9

Basics – XML Tree – Syntax – XML Elements – Attributes – Validation – XML Viewing – CSS – XSLT – XML Namespace – CDATA - XML Parser – DOM – XML to HTML – Applications

XML Technology 9

XML Essentials – Schema – XML Design Techniques – Security – Transformation – Query – XML Components – XML Processing – XML Publishing

Web Services Fundamentals 9

RPC concepts – RMI Implementation – Concepts and Use of Web Services - Web Service Architecture - JAX-RPC – XML-RPC - Web Services Platform: SOAP – UDDI – WSDL – Simple Web Service Creation – Deployment

Web Services Development and Deployment 9

XML Web Services Standards – AXIS2 Framework - SOAP Messages – Life Cycle of a Message – Message Exchange Patterns – Handling of SOAP Messages - AXIS2 Clients and Services – SOAP Messages with Attachments – Applications

DEPLOYMENT PLATFORM ARCHITECTURAL MODELS 9

AXIS2 Requirements – Architecture – Information Model – XML Processing Model – SOAP Message Processing Model – Deployment Model – Client Communication with Web Services – Transports – Code Generation – Data Binding – Modules – Handlers – SOAP Faults

Total: 45 Periods

Text Books

1. Gustavo Alonso, Fabio Casati, Harumi Kuno, Vijay Machiraju, “Web Services - Concepts, Architectures and Applications”, Springer Verlag, 2010.
2. Ron Schmelzer, “XML and Web Services Unleashed”, Sams, 2002.

Reference Books

1. Frank. P. Coyle, XML, Web Services And The Data Revolution, Pearson Education, 2002.
2. Eric Newcomer, “Understanding Web Services: XML, WSDL, SOAP and UDDI”, Addison Wesley Professional, 2002.
3. David A. Chappell and Tyler Jewell, “Java Web services”, O'Reilly Media, Inc., 2002.
4. Anne Thomas Mannes, “Web Services: A Manger’s Guide”, Addison Wesley Professional, 2003.
5. <http://www.w3schools.com>
6. <http://www.w3.org>
7. <http://axis.apache.org/axis2/java/core/docs/toc.html>

Implement the exercises from 1 to 4 using C/OpenGL/Java

1. Implementation of Algorithms for drawing 2D Primitives -
Line (DDA, Bresenham) – all slopes
Circle (Midpoint)
2. 2D Geometric transformations -
Translation
Rotation
Scaling
Reflection
Shear
Window-Viewport
3. Composite 2D Transformations
4. Liang - Barsky Line Clipping

Implement the exercises from 5 to 7 using OpenGL

5. 3D Transformations - Translation, Rotation, Scaling
6. 3D Projections – Parallel, Perspective
7. Creating 3D Scenes
8. Compression Algorithms - To implement text and image compression algorithms
9. Image Editing and Manipulation - Basic Operations on image using any image editing software, Creating gif animated images, Image optimization
10. 2D Animation – To create Interactive animation using any authoring tool

USING DSP TRAINER

1. Study of various Addressing modes of DSP with simple programming examples using TMS320C5X, TMS320C67XX, ADSP 21XXX, BF53X
2. Implementation of Linear and Circular Convolution
3. Sampling of Input Signal and Display
4. Waveform Generation
5. Calculation of FFT
6. Implementation of FIR and IIR Filters

USING MATLAB

1. Linear and Circular convolution of two sequences
2. Noise cancellation of Signal
3. Long Sequence convolution (Overlap add & save method)
4. Design of FIR Filters
5. Design of IIR Filters
6. Calculation of FFT of a Signal

CS307 COMPUTER NETWORKS LABORATORY

L T P C
0 0 3 2

1. Familiarization with configuring and installing a LAN
2. Learn to use basic networking commands like ipconfig, ping, arp, rarp, TCP Dump, Netstat, TraceRoute
3. Simple Chat Program using TCP Sockets
4. Simulation of HTTP Protocol using TCP Sockets
5. Simulation of Sliding Window Protocol using TCP Sockets
6. Simulation of DNS using UDP Sockets
7. Simulation of Ping using Raw Sockets
8. Learn to use commands like Develop applications and understand the behavior of TCP Options
9. Study of TCP/UDP performance using OPNET tool
10. Performance comparison of MAC protocols using OPNET tool
11. Performance comparison of Routing protocols using OPNET tool
12. Study and configure functionalities of a router and switches (or by simulation)

Semester VII (Regulations 2008)

Course Code	Course Title	L	T	P	C
CS401	Mobile and Pervasive Computing	3	0	0	3
EE956	Wireless and Sensor Networks	3	0	0	3
CS911	Cloud Computing and Services	3	0	0	3
CS961	Cryptography and Network Security	3	0	0	3
CS403	Mobile and Pervasive Computing Laboratory	0	0	3	2
CS404	Project Phase - I	0	0	8	4
TOTAL		12	0	11	18

CS401 MOBILE AND PERVASIVE COMPUTING

L T P C
3 0 0 3

MOBILE NETWORKS

9

Overview of Wireless Communication – Media Access Control – SDMA, FDMA, TDMA, CDMA – Generation of Cellular Wireless Networks – GSM – Architecture – Protocols – Connection Establishment – Frequency Allocation – Localization – Handover – Security – GPRS

WIRELESS NETWORKS

9

Wireless LANs and PANs – IEEE 802.11 Standard – Architecture – Services – Network – Emerging technologies – Piconet - Bluetooth, Wi-Fi, WiMAX, 3G, WATM – Mobile IP protocols – WAP push architecture – WML Scripts and Applications

ROUTING AND MOBILITY MANAGEMENT

9

Mobile IP – DHCP – Handoff in wireless mobile networks – Handoff schemes – Location management in cellular networks – Mobility models – Location and Tracking management schemes – Time, Movement, Profile and Distance based update strategies – ALI technologies - Routing in Mobile Ad-hoc Networks - TCP Improvements - TCP over 2.5/3G

TRANSPORT AND APPLICATION LAYERS

9

Mobile TCP – WAP – Architecture – WWW Programming Model – WDP – WTLS – WTP – WSP – WAE – WTA Architecture – WML – WML Scripts

PERVASIVE COMPUTING

9

Pervasive computing Principles – Characteristics – Infrastructure –Interaction Transparency – Context Aware – Applications – Device Technology – Hardware, Human-machine Interfaces, Biometrics, and Operating systems – Device Connectivity – Protocols, Security, and Device Management – Pervasive Web Application architecture –Access from PCs and PDAs – Access via WAP

Total: 45 Periods

TEXT BOOKS

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson, 2009.
2. Frank Adelstein, Sandeep KS Gupta, Golden Richard, “Fundamentals of Mobile and Pervasive Computing”, Tata McGraw-Hill Edition, 2005.

3. Asoke Talukder, Hasan Ahmed, Rupa Yavagal, “Mobile Computing: Technology, Applications and Services Creation”, Second Edition, TMH, 2010.
4. Jochen Burkhardt, “Pervasive Computing: Technology and Architecture of Mobile Internet Applications”, Addison- Wesley Professional; 3rd edition, 2007.

REFERENCE BOOKS

1. William Stallings, “Wireless Communication and Networks”, Pearson Education, 2009.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, Principles of Mobile Computing”, Springer, New York, 2003.
3. Ivan Stojmenovic, “Handbook of Wireless Networks and Mobile Computing”, Wiley, 2006.
4. Stefan Poslad, “Ubiquitous Computing: Smart Devices, Environments and Interactions”, Wiley, 2009.

EE956 WIRELESS AND SENSOR NETWORKS

L T P C
3 0 0 3

Fundamentals 9

Introduction to Sensor Networks - Unique constraints and challenges - Advantage of Sensor Networks - Applications of Sensor Networks - Cellular and Mobile Adhoc NETWORKS (MANETs) - Enabling technologies for Wireless Sensor Networks – Key Definitions of Sensor Networks – Collaborative Processing.

Architectures 9

Sensor Node Hardware and Network Architecture: Single-Node Architecture - Hardware components & Design constraints - Operating Systems and Execution Environments - Network architecture - Physical Layer and Transceiver Design Considerations - Optimization goals and figures of merit - Design principles for WSNs - Service interfaces of WSNs - Gateway concepts.

Networking Sensors 9

Sensor Management Network Protocols - MAC Protocols - Issues in designing MAC Protocol for WSNs - Classification of MAC Protocols - S-MAC Protocol - B-MAC protocol - IEEE 802.15.4 standard - Zig Bee - Dissemination protocol for large sensor network - Routing protocols: Issues in designing routing protocols - Classification of routing protocols - Energy-efficient routing - Unicast - Broadcast - Multicast - Geographic routing.

Infrastructure Establishment 9

Topology control - Clustering - Time Synchronization - Deployment and Configuration: Localization and positioning - Coverage and connectivity - Single-hop and multi-hop localization - Self configuring localization systems - Roles of Sensor Nodes and Utilities – Sensor Tasking and Control.

Sensor Network Platforms and Tools 9

Data Storage and Manipulation: Data Centric and Content Based Routing - Compression Technologies for WSN - Data Aggregation Technique - Applications: Detecting unauthorized activity using a Sensor Network - WSN for Habitat Monitoring - Operating Systems for Wireless Sensor Networks - Introduction to TinyOS and nesC - Berkeley Motes - Programming Challenges - Node Level Software Platforms - Node Level Simulators - State-centric Programming.

Total: 45 Periods

Text Books

1. Holger Kerl, Andreas Willig, “Protocols and Architectures for Wireless Sensor Networks”, John Wiley & Sons, 2005.
2. Feng Zhao, Leonidas Guibas, “Wireless Sensor Networks: An Information Processing Approach”, Elsevier, 2007.

Reference Books

1. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.
2. Bhaskar Krishnamachari, “Networking Wireless Sensors”, Cambridge University Press, 2005.
3. C. Siva Ram Murthy and B. S. Manoj, “Adhoc Wireless Networks: Architectures and Protocols”, Prentice Hall, 2004.
4. Kazem Sohraby, Daniel Minoli and Taieb Znati, “Wireless Sensor Networks - Technology, Protocols, and Applications”, John Wiley, 2007.
5. Wayne Tomasi, “Introduction to Data Communication and Networking”, Pearson Education, 2007.

CS911 CLOUD COMPUTING AND SERVICES

L T P C

3 0 0 3

INTRODUCTION

9

Cloud definition, benefits, usage scenarios - History of Cloud Computing - Cloud Architecture - Types of Clouds - Business Models around Clouds – Major Players in Cloud Computing - Issues in Clouds - Eucalyptus - Nimbus - Open Nebula - Cloud Sim

CLOUD SERVICES

9

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as a Service - Service providers - Google, Amazon, Microsoft Azure, IBM, Sales Force

COLLABORATION USING CLOUD SERVICES

9

Email Communication over the Cloud - CRM Management - Project Management - Event Management - Task Management – Calendar - Schedules - Word Processing – Presentation – Spreadsheet - Databases – Desktop - Social Networks and Groupware

VIRTUALIZATION FOR CLOUD

9

Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual Machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM, VMWare, Virtual Box - Hyper-V

SECURITY, STANDARDS AND APPLICATIONS

9

Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the Cloud

Total: 45 Periods

TEXT BOOKS

1. John Rittinghouse & James Ransome, "Cloud Computing, Implementation, Management and Strategy", CRC Press, 2010.
2. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate". Que Publishing, August 2008.
3. James E Smith, Ravi Nair, "Virtual Machines", Morgan Kaufmann Publishers, 2006.

REFERENCE BOOKS

1. David E.Y. Sarna, "Implementing and Developing Cloud Application", CRC press 2011.
2. Lee Badger, Tim Grance, Robert Patt-Corner, Jeff Voas, " Draft cloud computing synopsis and recommendations", NIST, May 2011.
3. Anthony T Velte, Toby J Velte, Robert Elsenpeter, "Cloud Computing : A Practical Approach", Tata McGraw-Hill 2010.
4. Haley Beard, "Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pty Limited, July 2008.
5. G.J.Popek, R.P. Goldberg, "Formal Requirements for Virtualizable Third Generation Architectures", Communications of the ACM, No.7 Vol.17, July 1974.

CS961 CRYPTOGRAPHY AND NETWORK SECURITY

L T P C

3 0 0 3

INTRODUCTION

9

Security trends – Attacks and Services – Classical Crypto Systems – Different types of Ciphers – LFSR sequences – Basic Number theory – Congruence Modulo – Chinese Remainder theorem – Modular exponentiation – Fermat and Euler's theorem – Secure programs – Non-malicious Program Errors – Viruses – Controls against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project

ENCRYPTION TECHNIQUES

9

Simple DES – Differential Crypto Analysis – DES – Modes of operation – Triple DES – AES – RC5, RC4 – RSA – Attacks – Primality test – Factoring

KEY EXCHANGE AND AUTHENTICATION TECHNIQUES

9

Discrete Logarithms – Computing discrete logarithms – Diffie–Hellman key exchange – Elliptic curve cryptography Key exchange – Elgamal Public Key Cryptosystems – Message Authentication codes – Hash functions – Hash algorithms – Secure Hash – Birthday attacks – MD5 – Authentication protocols – Digital signatures – RSA, DSA

NETWORK SECURITY AND STANDARDS

9

Public Key Infrastructure – Kerberos – X.509 – IPSec – Virtual Private Networks – E-Mail Security – PGP and PEM – Web Security – Secured DNS – SSL, TLS and SET – CoBIT Framework – Compliances – Credit Card Applications – GLBA – Standards – ISO 27000

OPERATING SYSTEMS AND DATABASE SECURITY

9

Trusted Operating systems – Security models – Designing trusted OS – Assurance – Database Security – Multi-level databases – Multi-level security

Total: 45 Periods

TEXT BOOKS

1. Wade Trappe, Lawrence C Washington, “Introduction to Cryptography with Coding Theory”, Second Edition, Pearson Education, 2007.

2. William Stallings, "Cryptography and Network Security Principles and Practice", Fifth Edition, Prentice Hall, 2010.
3. Matt Bishop, "Computer Security: Art and Science", Pearson Education Inc., 2003.

REFERENCE BOOKS

1. Charles Pfleeger, Shari Lawrence Pfleeger, Devin N Paul, "Security in Coding", Pearson, 2007.
2. Wenbo Mao, "Modern Cryptography Theory and Practice", Pearson, 2004.

CS403 MOBILE AND PERVASIVE COMPUTING LABORATORY L T P C
0 0 3 2

1. Develop mobile applications using J2ME environment and test it
2. Simulation of applications to access web sites using Microsoft Windows Mobile .net environment
3. Implementation of playing games and photo sharing applications using BREW (Binary Runtime Environment for Wireless Toolkit)
4. Simulation of Infotainment (news, weather forecasts etc) using WAP, WML Scripts
5. Pervasive devices connectivity – Using of server side programming in Java
6. Write web application via WAP phones
7. Develop simple applications for Android mobile devices
8. Develop an android application to access a Web service