**13MCA4201 MIDDLEWARE TECHNOLOGIES**

**Learning Objectives**

To understand the concept of basic software architecture, working of components, concept of Threading model, CORBA technologies, COM and .NET technologies.

**Total No. of Hours: 52**

**UNIT I: Introduction 12 Hrs**

**S**oftware architecture, components, objects, fundamental properties of component technology, modules, interfaces, callbacks, directory services, component architecture, components and middleware.

**UNIT II: Java Component Technologies 10 Hrs**

Threads, Java Beans, events and connections, properties, introspection, JAR files, reflection, object serialization, Enterprise Java Beans, Distributed Object Models, RMI and RMI-IIOP.

**UNIT III: CORBA Technologies 10Hrs**

Java and CORBA, Interface Definition language, Object Request Broker, System Object Model, Portable Object Adapter, CORBA services, CORBA component model, Containers, Application server, model driven architecture.

**UNIT IV: COM and .Net Technologies 10 Hrs**

COM, Distributed COM, object reuse, interfaces and versioning, dispatch interfaces, connectable objects, OLE containers and servers, Active X controls, .NET components, assemblies, appdomains, contexts, reflection, remoting.

**UNIT V: Component Frameworks and Development 10 Hrs**

Connectors, contexts, EJB containers, CLR contexts and channels, black box component framework, directory objects, cross-development environment, component-oriented programming, Component design and implementation tools, testing tools, assembly tools.

**TEXT BOOKS:**

1. Clemens Szyperski, (2002).*Component Software: Beyond Object-Oriented Programming.* (2nd ed.). Addison Wesley.

2. Ed Roman, (2004). *Enterprise Java Beans.* (3rd ed.). Wiley.

**REFERENCE BOOKS:**

1. Ash Rofail, Yasser Shohoud, (1999). *Mastering COM and COM+*. SybexInc

2. Jose Mojica, *COM+ Programming with Visual Basic.* O'Reilly MediaInc

3. Alan Gordon, *The COM and COM+ Programming Primer.* Object Innovations

4. Andreas Vogel, Keith Duddy, (1998). *Java Programming with CORBA.* John Wiley & Sons

5. Corry, Mayfield, Cadman, (1999), *COM/DCOM Primer Plus*. (1st ed.). Tec media

**13MCA4202 DATA COMMUNICATION AND NETWORKS**

**Learning Objectives**

To become familiar with layered communication architectures (OSI and TCP/IP),to understand the concepts of reliable data transfer and how TCP implements these concepts. To know the principles of congestion control and trade-offs in fairness and efficiency, and to learn the principles of routing and the semantics and syntax of IP.

**Total No. of Hours: 52**

**UNIT I: Introduction 10 Hrs**

**Uses of computer networks -** Business applications, Home applications, mobile users, social users.

**Network Hardware -** Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Wireless Networks, Home Networks, Internetworks.

**Reference Models -**The OSI Reference Model, The TCP/IP Reference model, A comparison of OSI and TCP Reference models, A critique of the OSI reference model and protocols, A critique of the TCP/IP reference model and protocols

**The Physical Layer –**Guided Transmission media, Magnetic media, twisted pair, Coaxial Cable, Fiber Optics.

**Wireless transmission -**The electromagnetic spectrum, Radio Transmission, Microwave Transmission, Infrared Transmission, Light wave transmission. Communication Satellites**,** Geostationary Satellites, Medium Earth Orbit Satellites, Low Earth Orbit Satellites

**UNIT II: The Data Link Layer 12 Hrs**

**Data Link Layer Design Issues -**Services provided to the network layer, Framing, Error control, Flow control.

**Error Detection and Correction -**Error correcting codes, Error detecting codes.

**Elementary Data Link Protocols -** Unrestricted Simplex Protocol, A simplex stop and wait protocol, Sliding window protocols**-**A one bit Sliding window protocol, Protocol using Go back N, A protocol using Selective repeat

**The medium access control sub layer -**The channel allocation problem**:** Static channel allocation in LAN and MAN, Dynamic Channel Allocation in LAN and MAN.

**Multiple Access Protocols -** ALOHA Carrier sense Multiple Access Protocols, Collision free Protocols, Limited Contention Protocols, Wavelength Division Multiple Access Protocols, Wireless LAN Protocols.

**Blue Tooth -** Blue tooth Architecture, Blue tooth Application.

**UNIT III: The Network Layer 10 Hrs**

**The Network Layer Design Issues -**Store and forward, packet switching, Service provided to the transport layer, Implementation of connectionless Service, implementation of connection oriented service. Comparison of virtual circuit and datagram subnets.

**Routing Algorithms -** The optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast routing, Routing for mobile host. **Congestion Control Algorithm -** General principles of congestion control, Congestion prevention policies, congestion controls in Virtual Circuit Subnet, Congestion control in Datagram subnet, Load Shedding, Jitter control.

**Quality of Service -**Requirements, Techniques for achieving good quality of service**,** Integrated Services, Differential Services

**The Network Layer in the Internet -** The IP protocol, IP address, Internet control protocol, OSPF, BGP, Internet multicasting, Mobile IP, IPv6

**UNIT IV: 10 Hrs**

**The Transport Layer**

**The Transport Service -** Services provided to the upper layers, Transport service primitives, Berkley Sockets, Elements of Transport protocols: Addressing, Connection Establishment, Connection release, flow control and buffering, multiplexing and crash recovery

**The Internet Transport Protocols -**Introduction to TCP, the TCP service model, the TCP protocol, TCP header, TCP connection establishment, release, Congestion n control, Wireless TCP and UDP

**UNIT V: 10 Hrs**

**The Application Layer**

DNS, DNS name space, Resource records. Name servers, Electronic mail, WWW, HTTP

**Network Security -** Cryptography – Introduction, Substitution Ciphers, Transposition ciphers, One- Time Pads, Two fundamental Cryptographic principles, Introduction to cryptographic algorithms

**TEXT BOOKS:**

1. Andrew S. Tanenbaum, (2006), *Computer Networks*. (4th ed.). Pearson Education

2. William Stallings, (2003), *Cryptography and Network Security– Principles and Practice.* (3rd ed.). Prentice Hall of India

**REFERENCE BOOKS:**

1. B. A. Forouzan, *Data Communication and Networking*, (2nd ed.). Tata McGraw Hill

2. J. F. Hayes, *Modelling and Analysis of Computer Communication Networks*

3. D. Bertsekas, R. Gallager, *Data Networks.* (2nd ed.). Prentice Hall of India

4. D.E. Comer, (2008), *Internetworking with TCP/IP.* Vol. I, (5th ed.). Prentice Hall of India

5. William Stallings, *Data & Computer Communication.* Maxwell Macmillan International Edition

**13MCA4203 DATA MINING AND BUSINESS INTELLIGENCE**

**Learning Objectives**

To study the concept of Data Warehousing, Architecture, OLAP, Data mining and machine learning algorithms and their applications in Business.

**Total No. of Hours: 52**

**UNIT I: Introduction to Data Warehousing 10 Hrs**

The need for data warehousing, Operational and informational Data stores, Data warehouse definition and characteristics, Data warehouse architecture

**Data warehousing component -** Data warehouse Database, Sourcing, Acquisition, Clean up and transformation tools, Metadata, Access tools, Data marts, Data warehousing administration and management, Information delivery system

**UNIT II: OLAP 10 Hrs**

ETL process, Fact Table, Dimension Table, Star Schema, Snow-flake schema, Online Analytical Processing (OLAP); Need for OLAP, Guidelines for OLAP - Multidimensional data model, Multidimensional vs. Multirelational, Categorization of OLAP tools, OLAP tools internet

**UNIT III: Data Mining and Business Intelligence 12 Hrs**

Introduction to data mining, The motivation, Learning from past mistake, Data mining, Measuring data mining effectiveness, Embedded data mining into business process, What is decision tree, Business score card, Where to use decision tree, The general idea, How the decision tree works, ID3 Algorithm.

**UNIT IV: 10 Hrs**

Nearest neighbour and clustering, Where to use clustering and nearest neighbour prediction, How clustering and nearest neighbour prediction works, Types of Clustering. Genetic Algorithm, What are Genetic Algorithms, Where to use Genetic Algorithm.

**UNIT V: XL Miner 10 Hrs**

Introduction to XL Miner, Problem Solving using XL Miner, Case Study: Segmenting, Clustering, Predicting, Classification.

**TEXT BOOKS:**

1. Alex Berson & Stephon J. Smith, (2003). *Data warehousing, Data mining and OLAP*. Tata McGraw Hill.

2. W. H. Inmon, (2002). *Building the Data warehouse*. John Wiley & Sons.

**REFERENCE BOOKS:**

1. Sam Anahory & Dennis Murray, (2003). *Data warehousing in the Real World – A Practical*

*Guide for Building Decision Support Systems.* Pearson Education

2. Rajeev Parida, (2006). *Principles and Implementation of Data warehousing.* Fire Wall

Media, Lakshmi Publications.

3. Margaret H. Dunham, (2003). *Data mining – Introductory and Advanced Topics.* Pearson Education, Prentice Hall.

4. Pang-Ning Tan, Michael Steinbach, & Vipin Kumar, (2006). *Introduction to Data mining.*

Pearson Addison Wesley.

5. W. H. Inmon, C. L. Gassey, (2004). *Managing the Data warehouse.* John Wiley & Sons

6. Fayyad, Usama M. et. Al, (2003). *Advances in knowledge discovery & Data mining*.

MIT Press.

7. GalitShmueli, Nitin R. Patel, Peter C. Bruce, (2007). *Data mining for Business Intelligence*.

Wiley India Pvt Ltd.

**13MCA4204 OBJECT ORIENTED ANALYSIS AND DESIGN USING UML**

**Learning Objectives**

To provide the knowledge and skills required to use UML notation, the industry standard for documenting and communicating the analysis and design of an object-oriented project.

**Total No. of Hours: 52**

**UNIT I: Introduction to UML 10 Hrs**

Importance of modelling, principles of modelling, Object oriented modelling, conceptual model of the UML, Architecture, and Software Development life cycle.

**UNIT II: Basic Structural Modelling 12 Hrs**

Classes, Relationships, Common mechanisms, and diagrams. Advanced structural modelling, advanced classes, advanced relationships, Interfaces, Types and Roles, Packages, class and object diagrams: Terms, concepts, modelling techniques, for class and Object diagrams.

**UNIT III: Basic Behavioural Modelling-I 10 Hrs**

Interactions, Interaction diagrams, Basic behavioural Modelling-II, Use cases, Use case Diagrams, Activity Diagrams.

**UNIT IV: Advanced Behavioural Modelling 10 Hrs**

Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

**UNIT V: Architectural modelling 10 Hrs**

Component, Deployment, Component diagrams and Deployment diagrams, Case study: The Unified Library Application

**TEXT BOOKS:**

1. Grady Booch, James Rumbaugh, Ivan Jacobson: *The Unified Modelling Language User Guide*. Pearson Education.

2. Hans-Erik, Magnus Penkar, Brian Lyons, David Fado, *UML 2 Toolkit.* WILEY-Dreamtech India Pvt Ltd.

**REFERENCE BOOKS:**

1. Meiler Page –Jones, *Fundamentals of Object Oriented Design in UML.* Pearson Education

2. Pascal Roques, *Modelling Software Systems using UML2*. WILEY- Dreamtech India Pvt Ltd.

3. Atul Kahate, *Object Oriented Analysis and Design.* The McGraw-Hill Companies

4. Mark Priestley, *Practical Object-Oriented Design with UML.* TATA McGrawHill

5. Craig Larman, *Applying UM and Patterns: An Introduction to Object –Oriented Analysis and Design and Unified Process.* Pearson Education

**13MCA4C01 XML AND WEB SERVICES**

**Learning Objectives**

To study the basics of XML, web services and concepts and to enable the students to develop their creativity in the web services.

**Total No. of Hours: 52**

**UNIT I: Introduction 10 Hrs**

Role of XML - XML and the Web-XML language basics – SOAP - Web Services-Revolutions of XML – Service Oriented Architecture (SOA)

**UNIT II: XML Technology 10 Hrs**

XML - Name spaces - Structuring with schemas and DTD - Presentation Techniques-Transformation - XML infrastructure

**UNIT III: SOAP 12 Hrs**

Overview of SOAP – HTTP - XML – ROP - SOAP: Protocol - Message structure- Intermediaries – Actors - Design patterns and Faults - SOAP with attachments

**UNIT IV: Web services 10 Hrs**

Overview – Architecture - key technologies – UDDI – WSDL – ebXML - SOAP and web services in E – Com - Overview of .NET and J2EE

**UNIT V: XML Security 10 Hrs**

Security overview - canonicalization - XML security – Framework - XML Encryption - XML Digital signature - XKMS Structure - Guidelines for signing XML documents - XML in practice

**REFERENCE BOOKS:**

1. Frank. P. Coyle. (2002) *XML, Web services and the data Revolution.* Pearson Education.

2. Ramesh Nagappan, Robert Skoczylas and Rima Patel Sriganesh (2004). *Developing java Web services.* Wiley Pub.

3. Sandeep chatterjee. (2004). *Developing Enterprise web services.* Pearson Education.

4. McGovern et al. (2005). *Java web services architecture*. Morgan Kaufmann Pub.

**13MCA42L1 NETWORK PROGRAMMING LAB**

1. Simple Message Passing Program.

2. Implementation of Client-Server Communication Using TCP.

3. Simple Chat Application

4. Implementation of File Transfer Protocol.

5. Implementation of CRC.

6. Implementation of Checksum.

7. Implementation of Bit Stuffing

8. Implementation of Sliding Window.

9. Implementation of Simple FTP client.

10. Reading IP and port ID from command line and sending message to server.

11. Implementation of Http Client.

12. Java Program for Message Group Window.

**13MCA42P1 ENTERPRISE COMPUTING PROJECT LAB**

The main deliverables of the course come from a self-proposed project. Students (individually or teams of maximum 2) will design, propose, and implement a project relevant to the enterprise computing theme using J2EE technologies. Typically, this will be the construction of some system component supporting enterprise computing (e.g., electronic commerce or supply chain) or an enterprise application. Other ideas are certainly possible. You are encouraged to discuss your ideas with the instructor and TA before proceeding to the proposal stage. A project report must be submitted by each team as the deliverable.