Semester-III

Subject Reference No	CSC501	Subject Title	Java Network Programming
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objective

This course assumes that students are aware of core java programming, advanced java and hence it starts from Network Basics and goes up to Network programming. It covers some topics related to client/server concepts.

At Course Completion

After complication of this course students can write good network based application using java. Students can appear for java certification examinations. Student can also work on networking and web projects.

Prerequisites

Student should know the programming in core java and advanced java.

UNIT I:

Introduction to Networking: Basic Network Concepts: Networks, The Layers of a Network, IP, TCP, and UDP, The Internet, The Client/Server Model, Internet Standards, Basic Web Concepts: URIs, HTML, SGML, and XML, HTTP, MIME Media Types, Server-Side Programs

UNIT II:

Looking Up Internet Addresses: The InetAddress Class, Inet4Address and Inet6Address, The NetworkInterface Class, Some Useful Programs, URLs and URIs: The URL Class, TheURLEncoder and URLDecoder Classes, The URL Class, Proxies, Communicating with Server-Side Programs Through GET, Accessing Password-Protected Sites

UNIT III:

Sockets for Clients: Socket Basics, Investigating Protocols with Telnet, The Socket Class, Socket Exceptions, Socket Addresses, Examples, Sockets for Servers, The ServerSocket Class, Some Useful Servers, **Secure Sockets:** Secure Communications, Creating Secure Client Sockets, Methods of the SSLSocket Class, Creating Secure Server Sockets, Methods of the SSLServerSocket Class, Non-Blocking I/O, An Example Client, An Example Server, Buffers, Channels, Readiness Selection

UNIT IV:

UDP Datagrams and Sockets: The UDP Protocol, The DatagramPacket Class, The DatagramSocket Class, Some Useful Applications, DatagramChannel, Multicast Sockets:What Is a Multicast Socket, Working with Multicast Sockets, Two Simple Examples, URLConnections: Opening URLConnections, Reading Data from a Server, Reading the Header, Configuring the Connection, Configuring the Client Request HTTP Header, Writing Data to a Server, Content Handlers, The Object Methods, Security Considerations for URLConnections, Guessing MIME Content Types, HttpURLConnection, Caches, JarURLConnection

UNIT V:

Protocol Handlers: What Is a Protocol Handler, The URLStreamHandlerClass,Writing a Protocol Handler, More Protocol Handler Examples and Techniques, The URLStreamHandlerFactory Interface, **Content Handlers:** What Is a Content Handler, The ContentHandler Class, The ContentHandlerFactory Interface, A Content Handler for the FITS Image Format, Remote Method Invocation: What Is Remote Method Invocation, Implementation, Loading Classes at Runtime, The java.rmi Package, The java.rmi.registry Package, The java.rmi.server Package,
The JavaMail **API:** What Is the JavaMail API, Sending Email, Receiving Mail, Password Authentication, Addresses, The URLName Class, The Message Class, The Part Interface, Multipart Messages and File Attachments, MIME Messages, Folders

Books

1. Java Network Programming, Third Edition, O'Reilly Media, Oct 2004
2. Java Network Programming and Distributed computing, Addison Wesley, March 2002

Additional Reference

1. www.java.com
2. http://www.dct.udn.vn/daotao/Resource/82487.pdf (E-book of Java Network Programming and distributed Computing)

Lab Exercise: CSC551 Practical based on CSC501

At least two experiments should carried out on each unit.

Subject Reference no	CSC502	Subject Title	Advanced Software Engineering and Technology
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To learn object oriented Software engineering skills through UML.
Prerequisite: The student must aware of software development paradigms.

UNIT I:

Introduction: Software Engineering, Software Engineering Concepts, Software Engineering Development Activities, Managing Software Development, **Modeling with UML:** An Overview of UML, Use Case Diagrams Class Diagrams, Interaction Diagrams, State Machine Diagrams, Activity Diagrams, **Modeling Concepts:** Systems, Models, and Views,Data Types, Abstract Data Types, and Instances,Classes, Abstract Classes, and Objects, Event Classes, Events, and Messages,Object-Oriented Modeling, Falsification and Prototyping.

UNIT II:

Requirements Elicitation Concepts :Functional Requirements, Nonfunctional Requirements, Completeness, Consistency, Clarity, and Correctness, Realism, Verifiability, and Traceability, Greenfield Engineering, Reengineering, and Interface Engineering, **Requirements Elicitation Activities** : Identifying Actors, Identifying Scenarios, Identifying Use Cases, Refining Use Cases, Identifying Relationships among Actors and Use Cases, Identifying Initial Analysis Objects, Identifying Nonfunctional Requirements, **Managing Requirements Elicitation** : Negotiating Specifications with Clients: Joint Application Design, Maintaining Traceability, Documenting Requirements

Elicitation,Analysis Concepts: Analysis Object Models and Dynamic Models, Entity, Boundary, and Control Objects, Generalization and Specialization, **Analysis Activities:** Identifying Entity Objects, Identifying Boundary Objects, Identifying Control Objects, Mapping Use Cases toObjects with Sequence Diagrams, Modeling Interactions among Objects with CRC Cards, Identifying Associations, Identifying Aggregates, Identifying Attributes, Modeling State-Dependent Behavior of Individual Objects, Modeling Inheritance Relationships between Objects

UNIT III:

System Design: UML Deployment Diagrams, **System Design Activities:** Addressing Design Goals, Managing System Design, Object Design, **Reuse Concepts:** Solution Objects, Inheritance, and Design Patterns, **Reuse Activities:** Selecting Design Patterns and Components, **Interface Specification Concepts:** Class Implementer, Class Extender, and Class User, Types, Signatures, and Visibility, Contracts: Invariants, Preconditions, and Post conditions, Object Constraint Language, OCL Collections: Sets, Bags, and Sequences, **Interface Specification Activities:** Identifying Missing Attributes and Operations, Specifying Types, Signatures, and Visibility, Specifying Pre- and Post conditions, Specifying Invariants, Inheriting Contracts, **Managing Object Design:** Documenting Object Design, Assigning Responsibilities

UNIT IV:

Mapping Models to Code Mapping Concepts: Model Transformation, Refactoring, Forward Engineering, Reverse Engineering, Transformation Principles, **Mapping Activities:** Optimizing the Object Design Model, Mapping Associations to Collections, Mapping Contracts to Exceptions, Mapping Object Models to a Persistent Storage Schema, **Managing Implementation:** Documenting Transformations, Assigning Responsibilities **Testing:** Faults, Erroneous States, and Failures, Test Cases, Test Stubs and Drivers, Corrections, **Testing Activities:** Component Inspection, Usability Testing, Unit Testing, Integration Testing, System Testing, **Managing Testing:** Planning Testing, Documenting Testing, Assigning Responsibilities, Regression Testing, Automating Testing, Model-based Testing

UNIT V:

Configuration Management: Configuration Management Concepts, Configuration Management Activities, Managing Configuration Management, Management **Project Management:** Project Management Concepts, Classical Project Management Activities, Agile Project Management Activities

Books:

1) Object-Oriented Software Engineering: Using UML, Patterns and Java, B. Bruegge& A. H. Dutoit, Prentice Hall

2) Object Oriented Software Engineering: A Use Case Driven Approach By Ivar Jacobson, Pearson publication.

3) Software Engineering: A Practitioners approach 7TH Editionby R. S. Pressman.

Lab Exercise: CSC552 Practical based on CSC502

At least two experiments should be carried out on each unit.

Subject Reference no	CSC503	Subject Title	Computer Vision
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To provide the mechanics for representation and analysis of Multispectral data.

Prerequisite: Student must have knowledge of Signal Processing, Image Processing, Neural Networks and Artificial Intelligence.

UNIT I:

CAMERAS: Pinhole Cameras, Perspective Projection, Affine Projection, **GEOMETRIC CAMERA MODELS:** Elements of Analytical Euclidean Geometry, Coordinate Systems and Homogeneous Coordinates, Coordinate System Changes and Rigid Transformations, Camera Parameters and the Perspective Projection, Intrinsic Parameters, Extrinsic Parameters, A Characterization of Perspective Projection Matrices, Affine Cameras and Affine Projection Equations, Affine Cameras, Affine Projection Equations, A Characterization of Affine Projection Matrices, **GEOMETRIC CAMERA CALIBRATION:** Least-Squares Parameter Estimation, Linear Least-Squares Methods, Nonlinear Least-Squares Methods, A Linear Approach to Camera Calibration, Estimation of the Projection Matrix, Estimation of the Intrinsic and Extrinsic Parameters, Degenerate Point Configurations, Taking Radial Distortion into Account, Estimation of the Projection Matrix, Estimation of the Intrinsic and Extrinsic Parameters, Degenerate Point Configurations, Analytical Photogrammetry, An Application: Mobile Robot Localization **RADIOMETRY-MEASURING LIGHT**: Light in, Foreshortening, Solid Angle, Radiance, Light at Surfaces, Simplifying Assumptions, The Bidirectional Reflectance Distribution Function, Example: The Radiometry of Thin Lenses, Important Special Cases, Radiosity, Directional Hemispheric Reflectance, Lambertian Surfaces and Albedo, Specular Surfaces, The Lambertian + Specular Model. **SOURCES, SHADOWS, AND SHADING:** Qualitative Radiometry, Sources and Their Effects, Radiometric, Properties of Light Sources, Point Sources, Line Sources, Area Sources, Local Shading Models, Local Shading Models for Point Sources, Area Sources and Their Shadows, Ambient Illumination, Application: Photometric Stereo, Normal and Albedo from Many Views, Shape from Normals, Interreftections: Global Shading Models, An Interreflection Model, Solving for Radiosity, The Qualitative Effects of Interreftections, **COLOR:** The Physics of Color, Radiometry for Colored Lights: Spectral Quantities, The Color of Sources, The Color of Surfaces, Human Color Perception, Color Matching, Color Receptors, Representing Color, Linear Color Spaces, Non-linear Color Spaces, Spatial and Temporal Effects, A Model for Image Color, Cameras, A Model for Image Color, Application: Finding Specularities, Surface Color from Image Color, Surface Color Perception in People, Inferring Lightness, Surface Color from Finite-Dimensional Linear Models

UNIT II:

LINEAR FILTERS: Linear Filters and, Convolution, Shift Invariant Linear Systems, Discrete Convolution, Continuous Convolution., Edge Effects in Discrete Convolutions, Spatial Frequency and Fourier Transforms, Fourier Transforms, Sampling and Aliasing,Sampling, Aliasing, Smoothing and Resampling, Filters as Templates, Convolution as a Dot Product, Changing Basis, Technique: Normalized Correlation and Finding Patterns, Controlling the Television by Finding Hands by Normalized Correlation, Technique: Scale and Image Pyramids, The Gaussian Pyramid, Applications of Scaled Representations, **TEXTURE:** Representing Texture, Extracting Image Structure with Filter Banks, Representing Texture Using the Statistics of Filter Outputs, Analysis (and Synthesis) Using Oriented Pyramids,The Laplacian Pyramid, Filters in the Spatial Frequency Domain, Oriented Pyramids, Application: Synthesizing Textures for Rendering, Homogeneity,, Synthesis by Sampling Local Models, **THE GEOMETRY OF MULTIPLE VIEWS:** Two Views, Epipolar Geometry, The Calibrated Case, Small Motions, The Uncalibrated Case, Weak Calibration, Three Views, Trifocal Geometry, The Calibrated Case, The

Uncalibrated Case, Estimation of the Trifocal Tensor, **STEREOPSIS:** Reconstruction, Image Rectification, Human Stereopsis, Binocular Fusion, Correlation, Multi-Scale Edge Matching, Using More Cameras Three Cameras, Multiple Cameras,

AFFINE STRUCTURE FROM MOTION: Elements of Affine Geometry, Affine Spaces and Barycentric Combinations, Affine Subspaces and Affine Coordinates, Affine Transformations and Affine Projection Models, Affine Shape, Affine Structure and Motion from Two Images, Geometric Scene Reconstruction, Algebraic Motion Estimation, Affine Structure and Motion from Multiple Images, The Affine Structure of Affine Image Sequences, A Factorization Approach to Affine Structure from Motion, From Affine to Euclidean Images, Euclidean Constraints and Calibrated Affine Cameras, Computing Euclidean Upgrades from Multiple Views, Affine Motion Segmentation, The Reduced Row-Echelon Form of the Data Matrix, The Shape Interaction Matrix, **PROJECTIVE STRUCTURE FROM MOTION:** Elements of Projective Geometry, Projective Spaces, Projective Subspaces and Projective Coordinates, Affine and Projective Spaces, Hyperplanes and Duality, Cross-Ratios and Projective Coordinates, Projective Transformations, Projective Shape, Projective Structure and Motion from Binocular Correspondences, Geometric Scene Reconstruction, Algebraic Motion Estimation, Projective Motion Estimation from Multilinear Constraints, Motion Estimation from Fundamental Matrices, Motion Estimation from Trifocal Tensors, Projective Structure and Motion from Multiple Images, A Factorization Approach to Projective Structure from Motion, Bundle Adjustment, From Projective to Euclidean Images

UNIT III:

APPLICATION: IMAGE-BASED RENDERING: Constructing 3D Models from Image Sequences, Scene Modeling from Registered Images, Scene Modeling from Unregistered Images, Transfer-Based Approaches to Image-Based Rendering, Affine View Synthesis, Euclidean View Synthesis, The Light Field, **SEGMENTATION BY CLUSTERING** What Is Segmentation? Model Problems, Segmentation as Clustering, Human Vision: Grouping and Gestalt, Applications: Shot Boundary Detection and Background Subtraction, Background Subtraction, Shot Boundary Detection, Image Segmentation by Clustering Pixels, Segmentation Using Simple Clustering Methods, Clustering and Segmentation by K-means, Segmentation by Graph-Theoretic Clustering, Terminology for Graphs, The Overall Approach, Affinity Measures, Eigenvectors and Segmentation, Normalized Cuts, **SEGMENTATION BY FITTING A MODEL:** The Hough Transform, Fitting Lines with the Hough Transform, Practical Problems with the Hough Transform, Fitting Lines, Line Fitting with Least Squares, Which Point Is on Which Line?, Fitting Curves, Implicit Curves, Parametric Curves, Fitting as a Probabilistic Inference Problem, Robustness, M-estimators, RANSAC, Example: Using RANSAC to Fit Fundamental Matrices, An Expression for Fitting Error, Correspondence as Noise, Applying RANSAC, Finding the Distance, Fitting a Fundamental Matrix to Known Correspondences

UNIT IV:

SEGMENTATION AND FITTING USING PROBABILISTIC METHODS: Missing Data Problems, Fitting, and Segmentation, Missing Data Problems, The EM Algorithm, The EM Algorithm in the General Case, The EM Algorithm in Practice, Example: Image Segmentation, Revisited, Example: Line Fitting with EM, Example: Motion Segmentation and EM, Example: Using EM to Identify Outliers, Example: Background Subtraction Using EM, Example: EM and the Fundamental Matrix, Difficulties with the EM Algorithm, Model Selection: Which Model Is the Best Fit? Basic Ideas, AIC-An Information Criterion, Bayesian Methods and Schwartz' BIC, Description Length, Other Methods for Estimating Deviance, **APPLICATION: FINDING IN DIGITAL LIBRARIES:** Background: Organizing Collections of Information, How Well Does the System Work?, What Do Users Want?, Searching for Pictures, Structuring and Browsing, Summary Representations of the Whole Picture, Histograms and Correlograms, Textures and Textures of Textures, Representations of Parts of the Picture, Segmentation, Template Matching, Shape and Correspondence, Clustering and Organizing Collections, Video **TRACKING WITH LINEAR DYNAMIC MODELS:** Tracking as an Abstract Inference Problem, Independence Assumptions, Tracking as Inference, Overview, Linear

Dynamic Models, Drifting Points, Constant Velocity, Constant Acceleration, Periodic Motion, Higher Order Models, Kalman Filtering, The Kalman Filter for a ID State Vector, The Kalman Update Equations for a General State Vector, Forward-Backward Smoothing, Data Association, Choosing the Nearest-Global Nearest Neighbours, Gating and Probabilistic Data Association, Applications and Examples, Vehicle Tracking

UNIT V:

MODEL-BASED VISION: Initial Assumptions, Obtaining Hypotheses, Obtaining Hypotheses by Pose Consistency, Pose Consistency for Perspective Cameras, Affine and Projective Camera Models, Linear Combinations of Models, Obtaining Hypotheses by Pose Clustering, Obtaining Hypotheses Using Invariants, Invariants for Plane Figures, Geometric Hashing, Invariants and Indexing, Verification, Edge Proximity, Similarity in Texture, Pattern and Intensity, Application: Registration in Medical Imaging Systems, Imaging Modes, Applications of Registration, Geometric Hashing Techniques in Medical Imaging, Curved Surfaces and Alignment **FINDING TEMPLATES USING CLASSIFIERS:** Classifiers, Using Loss to Determine Decisions, Overview: Methods for Building Classifiers, Example: A Plug-in Classifier for Normal Class-conditional Densities, Example: A Nonparametric Classifier Using Nearest Neighbors, Estimating and Improving Performance, Building Classifiers from Class Histograms, Finding Skin Pixels Using a Classifier, Face Finding Assuming Independent Template Responses, Feature Selection, Principal Component Analysis, Identifying Individuals with Principal Components Analysis, Canonical Variates, Neural Networks, Key Ideas, Minimizing the Error, When to Stop Training, Finding Faces Using Neural Networks, Convolutional Neural Nets, Support Vector Machines for Linearly Separable Daiasets, Finding Pedestrians Using Support Vector Machines **ASPECT GRAPHS:** Visual Events: More Differential Geometry, The Geometry of the Gauss Map, Asymptotic Curves, The Asymptotic Spherical Map, Local Visual Events, The Bitangent Ray Manifold, Multilocal Visual Events, Computing the Aspect Graph, Step I: Tracing Visual Events, Step 2: Constructing the Regions, Remaining Steps of the Algorithm, An Example, Aspect Graphs and Object Localization

Books:

1. Computer Vision: A Modern Approach, Forsyth Ponce , Pearson Education
2. Image Processing, Analysis and Machine Vision, Milan Sonka, Thomson Learning

References:

1. Machine Vision, Jain R C Kasturi R, McGrawHill
2. Three Dimensional Computer Vision, Y Shirai, Springer Verlag
3. Computer And Robot Vision Vo I and II, Haralick R M And Shapiro L G, Addison Wesley
4. Computational Vision, Wechsler, Academic Press
5. Robot Vision, Horn B K P, Cambridge MIT press
6. Digital Image Processing & Computer Vision, Robert J Schalkoff, John Willey Publication

Lab Exercise: CSC553 Practical based on CSC503

At least two experiments should be carried out on each unit.

Elective-I

Subject Reference no	CSC421	Subject Title	Advanced Embedded System
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: Studying the various practical aspects of micro controller and microprocessor in terms of Embedded Systems design.

Prerequisite: Student must aware of microprocessor programming using ALP, Microprocessor Architecture, Instruction set and machine code generations, and C Programming.

UNIT I:

Introduction to Embedded Systems: Embedded Systems, Processor Embedded into a System, Embedded Hardware Units and Devices in a System, Embedded Software in a System,Examples of Embedded Systems, Embedded System-on-chip (Soc) and Use of VLSI Circuit Design Technology, Complex Systems Design and Processors,Design Process in Embedded System, Formalization of System Design,Design Process and Design Examples,Classification of Embedded Systems, Skills Required for an Embedded System Designer **8051 and Advanced Processor Architectures, Memory Organization and Real-world Interfacing:** 8051 Architecture,Real World Interfacing, Introduction to Advanced Architectures, Processor and Memory Organization,Instruction-Level Parallelism, Performance Metrics, Memory-Types, Memory-Maps and Addresses,Processor Selection, Memory Selection, **Devices and Communication Buses for Devices Network** :Types and Examples, Serial Communication Devices,Parallel Device Ports, Sophisticated Interfacing Features in Device Ports, Wireless Devices, Timer and Counting Devices, Watchdog Timer,Real Time Clock, Networked Embedded Systems,Serial Bus Communication Protocols, Parallel Bus Device Protocols-Parallel Communication Network Using ISA, PCI, PCI-X and Advanced Buses, Internet Enabled Systems-Network Protocols, Wireless and Mobile System Protocols

UNIT II:

Device Drivers and Interrupts Service Mechanism: Programmed-I/O Busy-wait Approach without Interrupt Service Mechanism, ISR Concept, Interrupt Sources, Interrupt Servicing (Handling) Mechanism, Multiple Interrupts, Context and the Periods for Context Switching, Interrupt Latency and Deadline, Classification of Processors Interrupt Service Mechanism from Context-Saving Angle, Direct Memory Access, Device Driver Programming, **Programming Concepts and Embedded Programming in C, C++ and Java:** Software Programming in Assembly Language (ALP) and in High-Level Language 'C' 235 , C Program Elements: Header and Source Files and Preprocessor Directives, Program Elements: Macros and Functions, Program Elements: Data Types, Data Structures, Modifiers, Statements, Loops and Pointers, Object-Oriented Programming, Embedded Programming in C++, Embedded Programming in Java, **Program Modeling Concepts:** Program Models, DFG Models, State Machine Programming Models for Event-controlled Program Flow, Modeling of Multiprocessor Systems, UML Modelling

UNIT III:

Interprocess Communication and Synchronization of Processes, Threads and Tasks: Multiple Processes in an Application, Multiple Threads in an Application, Tasks, Task States, Task and Data, Clear-

cut Distinction between Functions, ISRS and Tasks by their Characteristics, Concept of Semaphores, Shared Data, Interprocess Communication, Signal Function, Semaphore Functions, Message Queue Functions, Mailbox Functions, Pipe Functions, Socket Functions, RPC Functions, **Real-Time Operating Systems** : OS Services, Process Management, Timer Functions, Event Functions, Memory Management, Device, File and 10 Subsystems Management, Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls, Real-time Operating Systems, Basic Design Using an RTOS, Rtos Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Metrics, OS Security Issues,

UNIT IV:

***R*eal-time Operating System Programming-I:** MicrodOS-II and VxWorks, Basic Functions and Types of RTOSES, RTOS mCOS-II, RTOS VxWorks, **Real-time Operating System Programming-II:** Windows CE, OSEK and Real-time Linux Functions,Windows CE, OSEK, Linux 2.6.x and RTLinux, **Design Examples and Case Studies of Program Modeling and Programming with RTOS-I:** Case Study of Embedded System Design and Coding for an Automatic, Chocolate Vending Machine (ACYM) Using Mucos RTOS, Case Study of Digital Camera Hardware and Sofware Architecture, Case Study of Coding for Sending Application Layer Byte Streams on a TCPIIP Network Using RTOS Vxworks

UNIT V:

Design Examples and Case Studies of Program Modeling and Programming with RTOS-2: Case Study of Communication Between Orchestra Robots, Embedded Systems in Automobile, Case Study of an Embedded System for an Adaptive Cruise Control (ACC) System in a Car, Case Study of an Embedded System for a Smart Card, Case Study of a Mobile Phone Software for Key Inputs, **Embedded Software Development Process and Tools:** Introduction to Embedded Software Development Process and Tools, Host and Target Machines, Linking and Locating Software, Getting Embedded Software into the Target System, Issues in Hardware-Software Design and Co-design, **Testing, Simulation and Debugging Techniques and Tools:** Testing on Host Machine: Simulators, Laboratory Tools

Books:

1. Embedded Systems: Architecture, Programming and Design, Raj Kamal, McGraw Hill

References:

1. "Embedded System Design" Frank Vahid&Tony Givargis; John Wiley &sons, Inc.
2. "Real – Time Systems and software"Alan C. Shaw ; John Wiley &Sons Inc
3. "Fundamentals of embedded Software", Daniel W. Lewis, Pearson
4. "Real time Systems", J. W. S. Liu, Pearson
5. "Embedded Realtime System Programming", S. V. Iyer and P. Gupta, TMH
6. "An Embedded System Primer" David E. Simon; Addison-Wesley Pub
7. "Embedded System Design" Steve Heath; Butterworth-Heinemann Pub.
8. "Embedded System Computer Architecture" Graham Wilson, Butterworth-Heinemann

Lab Exercise: CSC422 Practical based on CSC421

At least two experiments should be carried out on each unit.

Subject Reference no	CSC423	Subject Title	Data Warehousing
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objective:

A student completing this course unit should:

1) Have an understanding of the foundations, the design, the maintenance, the evolution and the use of data warehouses, by looking at these topics in a rigorous way.
2) Have mastered the basic range of techniques for creating, controlling and navigating dimensional business databases, by being able to use a powerful tool for dimensional modeling and analysis.

Prerequisite: Student must aware of Relational Database management system, its organization and management using Queries

UNIT I:

Data Warehousing Concepts: Data Warehouse Architectures, **Logical Design in Data Warehouses:** Logical Versus Physical Design in Data Warehouses, Data Warehousing Schemas, Data Warehousing Objects, **Physical Design in Data Warehouses:** Physical Design, Data Segment Compression, Integrity Constraints, Indexes and Partitioned Indexes, Materialized Views, Dimensions

UNIT II:

Hardware and I/O Considerations in Data Warehouses: Overview of Hardware and I/O Considerations in Data Warehouses, Automatic Striping, Manual Striping, Local and Global Striping, Analyzing Striping, Striping Goals, RAID Configurations, Striping, Mirroring, and Media Recovery, RAID 5, The Importance of Specific Analysis, **Parallelism and Partitioning in Data Warehouses:** Granules of Parallelism, Block Range Granules, Partition Granules, Partitioning Design Considerations, Types of Partitioning, Partitioning Methods, Performance Issues for Range, List, Hash, and Composite Partitioning, Partitioning and Data Segment Compression, Data Segment Compression and Bitmap Indexes, Partition Pruning, Avoiding I/O Bottlenecks, Partition-Wise Joins, Full Partition-Wise Joins, Miscellaneous Partition Operations, **Indexes:** Bitmap Indexes, Benefits for Data Warehousing Applications, Cardinality, Bitmap Join Indexes, Bitmap Join Index Restrictions, B-tree Indexes, Local Indexes Versus Global Indexes

UNIT III:

Integrity Constraints: Overview of Constraint States, Typical Data Warehouse Integrity Constraints, UNIQUE Constraints in a Data Warehouse, FOREIGN KEY Constraints in a Data Warehouse, RELY Constraints, Integrity Constraints and Parallelism, Integrity Constraints and Partitioning, **Materialized Views:** Creating, Registering Existing Materialized Views, Partitioning Materialized Views, Materialized Views in OLAP Environments, Choosing Indexes for Materialized Views, Invalidating Materialized Views Security Issues with Materialized Views, Altering Materialized Views, Dropping Materialized Views, Analyzing Materialized View Capabilities, **Dimensions:** Creating Dimensions, Viewing Dimensions, Using Dimensions with Constraints, Validating Dimensions, Altering Dimensions, Deleting Dimensions, Using the Dimension Wizard, **Overview of Extraction, Transformation, and Loading:** Overview of ETL, ETL Tools

UNIT IV:

Managing the Warehouse Environment: Overview of Extraction, Transformation and Loading, Extraction in Data Warehouses Transportation in Data Warehouses, Loading and Transformation, Maintaining the Data Warehouse, Change Data Capture, Summary Advisor, **Loading and Transformation:** Overview of Loading and Transformation in Data Warehouses, Loading Mechanisms, Transformation Mechanisms, Loading and Transformation Scenarios. **Maintaining the Data Warehouse:** Using Partitioning to Improve Data Warehouse Refresh, Optimizing DML Operations During Refresh, Refreshing Materialized Views, Using Materialized Views with Partitioned Tables, **Change Data Capture:** About Change Data Capture, Installation and Implementation, Security, Columns in a Change Table, Change Data Capture Views, Synchronous Mode of Data Capture, Publishing Change Data, Managing Change Tables and Subscriptions, Subscribing to Change Data, Export and Import Considerations

UNIT V:

Summary Advisor: Overview of the Summary Advisor in the DBMS_OLAP Package, Using the Summary Advisor, Estimating Materialized View Size, Is a Materialized View Being Used Summary Advisor Wizard, **Warehouse Performance:** Schema Modeling Techniques, SQL for Aggregation in Data Warehouses, SQL for Analysis in Data Warehouses, OLAP and Data Mining, Using Parallel Execution, Query Rewrite, **SQL for Aggregation in Data Warehouses:** Overview of SQL for Aggregation in Data Warehouses, ROLLUP Extension to GROUP BY, CUBE Extension to GROUP BY, GROUPING Functions, GROUPING SETS Expression, Composite Columns, Concatenated Groupings, Considerations when Using Aggregation, Computation Using the WITH Clause

REFERENCES:

1. Kimball, Reeves Ross, Thornthwaite, The Data Warehouse Lifecycle Toolkit, John Wiley & Sons, 1998.
2. Jiawei Han and MichelineKamber, Data Mining Concepts and Techniques, Elsevier Second edition.
3. Arun K Pujari, Data Mining Techniques, University Press, Tenth edition 2006, ISBN 81 7371 380 4
4. *Oracle9i* Data Warehousing Guide Release 2 (9.2) Part Number A96520-01 by Oracle Press.

Lab Exercise: CSC424 Practical based on CSC423

At least two experiments should carried out on each unit.

Subject Reference no	CSC425	Subject Title	Geographical Information Technology
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To provide the mechanics for representation and analysis of remotely sensed data.

Prerequisite:

UNIT I:

GIT: A CONCEPTUAL FRAMEWORK Introduction to GIT: Earth-A Unique Planet, Socio-Economic Challenges, Operation, Administration and Maintenance, Environmental and Natural Resource Management, **History and Evolution:** Ancient Period, Modern Period, Development of Computers, Development of

Remote Sensing, Indian Space Research, **Surveying and Mapping:** Measuring Techniques, Distance and Angle Measurements, Theodolites, Total Station, Data Accuracy and Precision, **Global Positioning System:** How GPS Works, Triangulation from Satellites, Satellite Signals, Code Measurement, Common Errors,, Differential Global Positioning System (DGPS), GPS Receivers,

UNIT II:

Projections and Coordinate Systems: Coordinates, Geographic Reference, Datum, Projection, Types of Map Projection, Cylindrical Projection, Conic Projections, Azimuthal Projections, **Data Diversity and Standards:** Modeling the Spatial Phenomena, Modeling Spatial Features, From Conceptualization to Implementation, Spatial Registration, Metadata, Data Standards, **Maps and Themes:** Map Symbols, Colour, Map Layout, Text, Thematic Representaiton of Data Maps, **GEOGRAPHIC INFORMATION SYSTEM: AN INSIGHT- Fundamentals of GIS:** GIS Database, The Real World Vs. GIS, Data Model, **GIS Data Models:** Vector Model, Digital Coding in GIS, Spaghetti Model, Topology Model, Raster Model, Advanced Models, GIS Processes,

UNIT III:

Data Quality: GIS Data Quality, Positional accuracy, Attribute Accuracy, Logical Consistency, Resolution/Precision, Completeness, Old Maps, Map Scales, Data Representation Format, Aerial Coverage, Accessibility, **Database Management System:** Database Fundamentals, Data Organization in the Computer, File-Based Systems, Databases and the Relational Model, File-Based Systems, Database Systems, Three-Level Architecture of Databases, Mappings Between Levels, Relational Data Structure, Characteristics of Relations, Entity and Entity Type, Relationship and Relationship Types, Relational Database Design Methodology, Creating the External Design, Creating the Conceptual Design, Creating the Internal Design, Structured Query Language (SQL), Spatial Database, **Hardware and Software:** ERDAS, Autocad Map, Planning Phase, Analysis Phase, Implementation Phase, Critical Success Factors for GIS, **Spatial Analysis:** Overlay Analysis of Raster Data, Overlay Analysis of Vector Data, Reclassification and Rebuilding, Shape and Measurement Analysis, Surface Analysis, Surface Models, Grid and TIN Data Structures,

UNIT IV:

GIS and the Internet: Annexure: GIS: An Analytical Case Study, **REMOTE SENSING General Background of Remote Sensing, Techniques of Remote Sensing:** Principle of Remote Sensing, Interaction of Earth Surface Features with EMR, Interactions with the Atmosphere, Atmospheric Windows, Spectral Characteristics of Water, Soil, Rocks and Vegetation Cover, Thermal Remote Sensing,**Remote Sensing Platforms and Sensors:** Across-Track Scanning (Whiskbroom), Along-Track Scanning (Pushbroom), False Colour Composite, Landsat Multispectral Scanner and the Matic Mapper, Return Beam Vidicon Camera (RBV), Multispectral Scanner (MSS), Thematic Mapper (TM), Spot, IRS-Series, Sensors in Microwave Region, SeasatSar, High Resolution Satellites,

UNIT V:

Digital Image Processing: What is Digital Image Processing, Why Digital Image Processing, Image Rectification, Image Enhancement, Digital Data Formats, **Aerial Photographs:** Process of Aerial Photography, Types of Aerial Photographs, Photo Indexing, Mosaics, Photo Scale, Stereoscope, Relief (Radial) Displacement, Vertical Exaggeration, Parallax, Some Terms Associated with Aerial Photograph, **Image Interpretation:** Image Elements or Photo-Recognition Elements, Terrain Elements, Process of Interpretation, Applications of Remote Sensing

Books:

1. An Introduction To Geographic Information Technology, SujitChoudhary, IK International
2. Fundamental Of Remote Sensing, George Joseph, Universities Press

UNIT V:
The Law and the Use of Biometrics.- Biometric System Security.- Spoof Detection Schemes.- Linkages between Biometrics and Forensic Science.- Biometrics in Government Sector.- Biometrics in the Commercial Sector.- Biometric Standards.- Biometrics Databases.- Index.

Text Book

1. Handbook of Biometrics, Jain, Anil K.; Flynn, Patrick; Ross, Arun A. (Eds.), 2008, Springer, ISBN 978-0-387-71040-2

Lab Exercise: CSC428 Practical based on CSC427
At least two experiments should be carried out on each unit.

Subject Reference no	CSC429	Subject Title	Mobile Computing
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To study and provide mechanism of wireless computing.
Prerequisite: Student must aware with computer networking, computer communication basics.

UNIT I:
Mobile Communications: An Overview: Mobile Communication, Mobile Computing, Mobile Computing Architecture, Mobile Devices, Mobile System Networks, Data Dissemination, Mobility Management, Security **Mobile Devices and Systems:** Mobile Phones, Digital Music Players, Handheld Pocket Computers, Handheld Devices: Operating Systems, Smart Systems, Limitations of Mobile Devices, Automotive Systems **GSM and Similar Architectures:** GSM-Services and System, Architecture, Radio Interfaces, Protocols, Localization, Calling Handover, Security, New Data Services, General Packet Radio Service, High-speed Circuit Switched Data, DECT

UNIT II:
Wireless Medium Access Control and CDMA-based Communication: Medium Access Control, Introduction to CDMA-based Systems, Spread Spectrum in CDMA Systems, Coding Methods in CDMA, IS-95 cdmaOne System, IMT-2000, i-mode, OFDM, **Mobile IP Network Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunnelling and Encapsulation Route Optimization, Dynamic Host Configuration Protocol, Mobile Transport Layer, Conventional TCP/IP Transport, Layer Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Methods of TCP-layer Transmission for Mobile Networks, TCP Over 2.5G/3G Mobile Networks,

UNIT III:
Databases: Database Hoarding Techniques, Data Caching, Client-Server Computing and Adaptation, Transactional Models, Query Processing, Data Recovery Process, Issues relating to Quality of Service, **Data Dissemination and Broadcasting Systems:** Communication Asymmetry, Classification of Data-Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Techniques, Digital Audio Broadcasting, Digital Video Broadcasting, **Data Synchronization in Mobile Computing Systems:** Synchronization, Synchronization Software for Mobile Devices, Synchronization Protocols, SyncML Synchronization Language for Mobile Computing, Sync4j (Funambol), Synchronized Multimedia