Annexture – I

GOA UNIVERSITY
FINAL YEAR OF BACHELOR'S DEGREE COURSE IN COMPUTER ENGINEERING
(Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER VII

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	P	O	Total
CE 7.1LT	Language Translators	3	1	2	3	100	25	-	25	150
CE 7.2CN	Computer Networks	3	1	2	3	100	25	-	25	150
CE 7.3DSP	Digital Signal Processing	3	1	2	3	100	25	-	50	175
CE 7.4	Elective I	3	1	2	3	100	25	-	50	175
CE 7.5	Elective II	3	1	0	3	100	25	-	-	125
CE 7.6	Project	-	-	4	-	-	25	-	50*	75
	TOTAL	15	05	12		500	150	-	200	850

*__25 Sessional marks will be split as follows:__

20 marks are for the Internal Test

5 marks are for continuous evaluation of Practicals/Assignments

*Seminar & Project Oral

Electives: A student must take One Elective from each Group.

Group I: Subjects for CE 7.4

a) VLSI Design
b) Software Development Frameworks(J2EE/.NET)
c) Fuzzy Logic and Neural Networks
d) Web Technologies

Group II: Subjects for CE 7.5

a) Data Compression
b) Geographical Information Systems.
c) Bio Informatics
d) Project Management and Quality Assurance

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SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER VIII

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	P	O	Total
CE 8.1ADSA	Advanced Data Structures and Algorithms	3	1	2	3	100	25	-	50	175
CE 8.2CCNS	Computer Cryptography and Network Security	3	1	2	3	100	25	-	50	175
CE 8.3	Elective III	3	1	2	3	100	25	-	50	175
CE 8.4	Elective IV	3	1	2	3	100	25	-	50	175
CE 8.5	Project	-	-	8	-	-	50	-	100*	150
	TOTAL	12	04	16	-	400	150	-	300	850

25 Sessional marks will be split as follows:

20 marks are for the Internal Test

5 marks are for continuous evaluation of Practicals/Assignments

*Seminar, demonstration & Oral

Electives: A student must take One Elective from each Group.

Group III: Subjects for CE 8.3

a) Embedded System Design
b) Multimedia Systems
c) Distributed Operating Systems
d) Data Mining
e) Web Services

Group VI: Subjects for CE 8.4

a) Genetic Algorithms
b) Image Processing
c) Mobile Computing
d) Machine Vision and Learning

Annexture – II

CE7.1LT LANGUAGE TRANSLATORS

Course Objectives:

This subject introduces various language translators involved in the process of translating a modern high-level language to executable code. The subject discusses phase/pass structure of Assembler, Macro preprocessor, Linker, Loader, and Compiler in greater detail.

Instructional Objectives:

To know the major steps involved in translating a high-level programming language down to a low-level target machine language

To understand the relationship between machine and assembly language, compilers, interpreters, linkers, loaders, assemblers and macro preprocessors.

Lectures per week	: (3 + 1 +2)
Max marks for theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for Orals	: 25
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5

(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Language processor concepts.	(02 Hrs)
Data Structures for language processors.	(03 hrs)
Assemblers: Design of a two pass assembler	(02 hrs)
Macros: Design of macro pre-processor.	(03 hrs)
Linkers and Loaders: Design issues of linkers and loaders	(02 hrs)

MODULE 2

Introduction to compiling (02 hrs)

- Analysis of source program
- Phases of a compiler
- Bootstrapping and cross compilers
- Compiler construction tools

Lexical Analysis (05hrs)

- The role of Lexical Analyser
- Input buffering
- Specification of tokens
- Recognition of tokens
- Finite automata
- Design of Lexical Analyzer Generator
- A language for specifying lexical analyzer: LEX tool

Syntax Analysis (03 Hrs)

The role of the Parser
Context free grammar
Bottom-up Parsing
Operator precedence parsing

MODULE3

LR Parsers, Top-down parser: Predictive parser. (05Hrs)
Parser generator tool: YACC
Intermediate Code generation: (05 Hrs)

Intermediate Languages
Declarations
Assignment statements
Boolean expressions
Case statement
Backpatching
Procedure call
Type checking

MODULE 4

Code optimization (03 hrs)

The principle sources of optimization
Optimization of basic blocks
Machine dependent optimization
Register allocation optimization

Code generation (05 Hrs)

Issues in the design of a code Generator
The target machine
Basic blocks and flow graphs
Next-use information
A simple Code generator
The DAG representation of basic blocks
Peephole Optimization
Generating code from DAGS

Symbol table management (02 Hrs)
Runtime storage management
Error handling

TEXT BOOKS

1. System programming and Operating Systems by D.M. Dhamdhere, Tata McGraw Hill, ISBN: 0-07-463579-4.
2. Compiler construction Principles, Techniques and Tools by Alfred V. Aho , Ravi Sethi and Jefferay D.Ulman, Pearson Education, ISBN: 81-7808-046-X.

REFERENCE BOOKS

1. Compiler Construction, Principles and Practices by Kenneth C. Louder, Galgotia Publication, Pvt Ltd, ISBN:0-534-93972-4
2. Theory and Practice of Compiler Writing by P. Trembly, McGraw Hill International Edition, ISBN:0-07-066616-4.
3. Principles of Compiler Design by Aho and Ulman, Narosa publishing House. ISBN: 81-85015-61-9.
4. Compiler design with FLEX and YACC by Vinu V. Das, PHI publication, ISBN:978-81-203-3251-5
5. lex and yacc by Doug Brown, John Levine, Tony Mason , O'Reilly Media, ISBN:1-56592-000-7.

C.E7.2CN COMPUTER NETWORKS

Course Objectives:

The goal of this course is to provide an introduction to basic concepts of communication and Networks and an understanding of the principle of the Data Communications, network architectures, and internetworking concepts.

Instructional Objectives:

Upon successfully completing the course, the student should:

1. Have an understanding of the principle of the Data Communications, network architectures, and internetworking concepts.
2. Have an understanding of the concepts and techniques used to model and implement communications between processes residing on independent host computers.

Lectures per week : (3 + 1 + 2)
Max marks for theory paper : 100
Max marks for sessionals : 20 + 5
Max marks for orals : 25
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module.

MODULE 1

Introduction

Reference Models (02 hrs)
- The OSI Reference Model
- The TCP/IP Reference Model
- A Comparison of the OSI and TCP/IP Reference Models

The Physical Layer

The Theoretical Basis for Data Communication (02 hrs)
- Fourier Analysis
- Bandwidth-Limited Signals
- The Maximum Data Rate of a Channel

The Data Link Layer

Data Link Layer Design Issues (02 hrs)
- Services Provided to the Network Layer
- Framing
- Error Control
- Flow Control

Error Detection And Correction (03 hrs)
- Error-Correcting Codes
- Error –Detecting Codes

Elementary Data Link Protocols (02 hrs)
- An Unrestricted Simplex Protocol
- A Simplex Stop-and-Wait Protocol
- A Simplex Protocol for a Noisy Channel

Sliding Window Protocols (02 hrs)
- A One-Bit Sliding Window Protocol
- A Protocol Using Go Back N

MODULE 2

The Medium Access Sublayer

Multiple Access Protocols (04 hrs)
- ALOHA
- Carrier Sense Multiple Access Protocols
- Collision-Free Protocols
- Limited-Contention Protocols
- Wavelength Division Multiple Access Protocols
- Wireless LAN Protocols

Ethernet (02 hrs)
- Ethernet Cabling
- Manchester Encoding
- The Ethernet MAC Sublayer Protocol

The Network Layer

Network Layer Design Issues (02 hrs)
- Store-and-Forward Packet Switching
- Services Provided to the Transport Layer
- Implementation of Connectionless Service
- Implementation of Connection-Oriented Service
- Comparison of Virtual-Circuit and Datagram Subnets

Routing Algorithms (04 hrs)
- The Optimality Principle
- Shortest Path Routing
- Flooding
- Distance Vector Routing
- Link State Routing
- Hierarchical Routing
- Broadcast Routing
- Multicast Routing

MODULE 3

Congestion Control Algorithms (03 hrs)
- General Principles of Congestion Control
- Congestion Prevention Policies
- Congestion Control in Virtual-Circuit Subnets
- Congestion Control in Datagram Subnets
- Load Shedding

The Network Layer In The Internet (04 hrs)
- The IP Protocol
- IP Addresses
- Internet Control Protocols

The Transport Layer

The Transport Service (03 hrs)
- Services Provided to the Upper Layers
- Transport Service Primitive
- Berkeley Sockets
- An Example of Socket Programming

MODULE 4

Elements Of Transport Protocols (05 hrs)
- Addressing
- Establishing a Connection
- Releasing a Connection

The Internet Transport Protocols: Udp
- Introduction to UDP
- Remote Procedure Call

The Internet Transport Protocols: Tcp (03 hrs)
- Introduction to TCP
- The TCP Service Model
- The TCP Protocol
- The TCP Segment Header
- TCP Connection Establishment
- TCP Connection Release

The Application Layer

DNS--Domain Name System (03 hrs)
- The DNS Name Space
- Resource Records
- Name Servers

Electronic Mail
- Architecture and Services
- The User Agent
- Message Formats
- Message Transfer
- Final Delivery

TEXT BOOKS

1. Computer Networks by Andrew S. Tannenbaum, PHI, ISBN:81-203-2175-8

REFERENCE BOOKS

1. Data communication and Networking by Behrouz A. Forouzan, Tata McGraw Hill, 0-07-060004-X
2. Data and Computer Communications by Williams Stallings, PHI, ISBN:81-203-2355-6

CE7.3DSP DIGITAL SIGNAL PROCESSING

Course Objective:

This course attempts to emphasize the practical relevance of DSP. This course aims at reducing the mathematical content involved in DSP to what is considered useful, essential and interesting. The theory covered in this course will help the students attain completeness and provide a good source of reference as they mature in the subject.

Instructional Objective:

At the end of the course, the student will be able to:

1. Illustrate the fundamentals and implementation of DSP techniques with practical examples and real-world applications.
2. Use realistic examples to prove important concepts and reinforce the Knowledge gained.
3. Use of Matlab software for simulation

Lectures per week : (3 + 1 + 2)
Max. Marks for Theory paper : 100
Max. Marks for Sessionals : 20 + 5
Max marks for orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered : 5
(At least one question from each module with two compulsory questions from any one module).

MODULE 1

Fundamentals of Signals and Systems (10 hrs)

Signals
Systems
Fourier Analysis of Discrete Time Signals
Fourier Analysis of Continuous Time Signals

MODULE 2

Discrete Time Processing of Continuous Time Signals (03 hrs)

Introduction
Structure of a Digital Filter
Frequency Domain Analysis of a Digital Filter
Quantization Errors

Fourier Analysis of Discrete Time Signals (07 hrs)

Introduction
Discrete Time Fourier Transform (DTFT)
Discrete Fourier Transform (DFT)
The DFT as an Estimate of the DTFT
DFT for Spectral Estimation
DFT for Convolution
DFT/DCT for Compression

The Fast Fourier Transform (FFT)

MODULE 3

Digital Filters (10 hrs)

Introduction
Ideal Versus Non-ideal Filters
Finite Impulse Response (FIR) Filters
Infinite Impulse Response (IIR) Filters

MODULE 4

Digital Filters Implementation (10 hrs)

Introduction
Elementary Operations
State Space Realization of Digital Filters
Robust Implementation of Digital Filters
Robust Implementation of Equiripple FIR Filters

TEXT BOOK:

1. Modern Digital Signal Processing – by Roberto Cristi, Thomson Brooks/Cole (Thomson Learning) ISBN 981-243-899-8.

CE7.4.a.VLSI VLSI DESIGN (ElectiveI)

Course Objective:

The subject is designed for graduate level to explore the methods of digital circuit design and Integrated circuit design procedures.

Instruction Objectives:

The first module is related to IC fabrication and materials required for IC fabrication second and third module are providing the conceptual knowledge of CMOS architecture, working and its usage in making digital circuits, fourth module explain the procedures of testing integrated circuit designs.

Lectures per Week : (3 + 1 + 2)
Max Marks for Theory Paper : 100
Max Marks for Sessionals : 20 + 5
Max Marks for Oral : 50
Duration of Paper : 3 hrs
Total No of Modules : 4
No. of Questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Fabrication of MOSFET'S (09 Hrs)

Introduction
Wafer Processing
Oxidation
Epitaxy and diffusion Fabrication process
Flow: Basics Steps
The CMOS n-well p-well twin-tub Process
Silicon on Insulator CMOS latch up and its prevention
Layout Design Rules
Full Custom Mask layout Design

MODULE2

MOS Transistor (06 Hrs)
The metal Oxide Semiconductor structure
The MOS system under external Bias
Structure and Operation of (MOSFET)
MOSFET current voltage Character tics
MOSFET Scaling and small Geometry effects
MOSFET Capacitance

Modeling MOS transistor using SPICE (03 Hrs)
Basic Concepts- The level 1Model Equation

MODULE 3

MOS Inverters and Static Characteristics (06 Hrs)

Introduction to MOS Inverters
Resistive Load Inverter
Inverters with N-type MOSFET Load and there Comparison
CMOS Inverter expressions for the critical voltage
Design of CMOS Inverter
Power and Area Consideration

MODULE 4

VLSI Design Methodology (07 Hrs)

VLSI Design flow Entity Declaration
Architecture Body
Configuration declaration
Package Declaration
Package Body
Model Analysis
Simulation

Design for Testability (06 Hrs)

Introduction
Fault types and Models
Controllability and Observability
AD-Hoc Testable Design techniques
Scan Based techniques
Built in Self test Techniques
Current Monitoring Iddq Test

TEXT BOOK:

1. CMOS Digital Integrated Circuits analysis and design 3rd Edition by Sung- Mo – Kang Yusuf Leblebigi, TMH, ISBN:0-07-0533077-7
2. VHDL primer 3rd edition by J. Bhaskar, Pearson Education Asia, ISBN:81-7808-0168
3. Principles of CMOS, VLSI Design by Neil H.E Westhe and Kamran Eshraghian, Edison Wesley Longman Ltd., ISBN: 81-7808-222-5

REFERENCE BOOK

1. Basic VLSI Design by Douglas Pucknell, Kamran Eshraghian, PHI, ISBN:81-203-0986-3
2. Modern VLSI design (Systems on Silicon) by Wayne Wolf, Pearson Education Ltd., ISBN:81-7808-653-0
3. Introduction to VLSI design by Eugene D. Gabricius, TMH, ISBN:0-07-100727

CE7.4.b.SDF SOFTWARE DEVELOPMENT FRAMEWORKS (J2EE/.NET) (Elective I)

Course Objectives:

To acquaint the students with the Software Development using J2EE and .NET Technologies as the Frameworks.

Instructional Objectives:

After completion of the course the students will gain familiarity with Design Patterns used in J2EE

Lectures per Week : (3 + 1 + 2)
Max Marks for Theory Paper : 100
Max Marks for Orals : 50
Max Marks for Sessionals : 20 + 5
Duration of Paper : 3 hrs
Total No of Modules : 4
No. of Questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Java Enterprise Design (01 Hr)
Design Patterns, J2EE,
Application Tiers,
Core Development Concepts

Unified Modeling Language (02 Hrs)
Class Diagrams, Interaction Diagrams,
Activity Diagrams,
Deployment Diagrams

Presentation Tier Architecture (01 Hr)
Server-side Presentation Tier,
Application Structure,
Building a Central Controller

Advanced Presentation Tier Design (02 Hrs)
Reuse in Web Applications,
Extending the Controller,
Advanced Views

Presentation Tier Scalability (02 Hrs)
Scalability and Bottlenecks
Content Caching
Resource Pool

The Business Tier (02 Hrs)

The Business Tier,
Domain Objects

MODULE 2

Tier Communications

Data Transfer Patterns

Database and Data Patterns (02 Hrs)

Data Access Patterns, Primary Key Patterns,
Object-Relational Mappings

Business Tier Concurrency (02 Hrs)

Abstracting Business Logic,
Accessing Remote Services,
Finding Resources

Enterprise Concurrency (02 Hrs)

Transaction Management,
General Concurrency Patterns,
Implementing Concurrency

Messaging (03 Hrs)

Messaging and Integration,
Message Distribution Patterns,
Message Types,
Correlating Messages,
Message Client Patterns,
Messaging and Integration

MODULE 3

Introduction to .NET (01 Hr)

Component Oriented Versus Object Oriented Programming,
Principles of Component Oriented Programming
.NET Adherence to Component Principles,
Developing .NET Components

.NET Component Oriented Programming (01 Hr)

Essentials
Language Independence,
Packaging and Developments
Binary Compatibility

Interface Based Programming (03 Hrs)

Separating Interface from Implementation,
Working with Interfaces,
Interfaces and Generics
Designing Interfaces,
Interfaces in Visual Studio 2005

Life Cycle Management (03 Hrs)

The Managed Heap,
Traditional Memory De-Allocation Schemas,
.NET Garbage Collection,
Object Finalization,
Deterministic Finalization

Versioning (03 Hrs)

Assembly Version Number,
Assembly Deployment Models,
Strong Assembly Names
Visual Studio 2005 and Versioning,
Custom Version Policies,
CLR Versioning

MODULE 4

Events (02 Hrs)

Delegate Based Events,
Working with .NET Events

ASYNCHRONOUS CALLS (04 Hrs)

Requirements for an Asynchronous Mechanism,
Revisiting Delegates,
Asynchronous Call Programming Models,
Asynchronous Events,
Asynchronous Invocation Pitfalls,
Synchronous Versus Asynchronous Processing.

Multithreading and Concurrency Management (06 Hrs)

Threads and Multithreading,
Components and Threads,
Working with Threads,
Synchronizing Threads,
Automatic Synchronization,
Manual Synchronization,
The Worker Thread Wrapper Class,
Synchronizing Delegates,
Using .NET Multithreading Services

TEXT BOOKS

1. J2EE Design Patterns by William Crawford and Jonathan Kaplan, O'REILLY, SHROFF Publishers and Distributors Pvt. Ltd, ISBN: 81-7366-737-3
2. Programming .NET Components by JUVAL LOWRY Second Edition, O'REILLY, Shroff Publishers and Distributors Pvt. Ltd, ISBN: 81-8404-034-2

CE7.4.c.FLNN FUZZY LOGIC AND NEURAL NETWORKS (Elective I)

Course Objective:

This course aims to introduce Neural networks and Fuzzy Logic as direct and simple as possible for an easy understanding of the methodology which has become an alternative to modeling of some physical and non-physical systems with scientific or mathematical basis and also to expert systems.

Instructional Objective:

At the end of the course the student will be able to:

1. Learn and appreciate the inner workings of Neural Networks and Fuzzy logic with respect to many diverse fields.
2. Describe many of the different Neural Network topologies like the BAM, the Perceptron, Hopfield memory, etc. with real code that shows example usages of the models to solidify the pursuer's understanding.

Lectures per Week : (3 + 1 + 2)
Max Marks for Theory Paper : 100
Max Marks for Sessionals : 20 + 5
Max Marks for Oral : 50
Duration of Paper : 3 hrs
Total No of Modules : 4
No. of Questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module)

MODULE 1

History of Neural Networks (03 Hrs)
Structure and function of a single neuron
Neural Net Architecture
Neural Learning
Common usage of neural networks in
- Classification
- Clustering
- Vector quantization
- Pattern association,
- Function approximation and forecasting.

Evaluation of networks
Implementation of neural networks

Perceptrons. (03 Hrs)
Linear Separability
Perceptron Training Algorithm
Guarantee of Success
Pocket algorithm
Adaline
Multilayer networks (04 Hrs)
Multilevel discrimination
Architecture, Objectives and working of Backpropagation algorithm
Setting the parameter values of Backpropagation algorithm
Accelerating learning process
Applications of Backpropagation algorithm.

MODULE 2

Prediction tasks using Recurrent Networks and feedforward networks (03 Hrs)
Radial basis functions
Polynomial networks

Unsupervised learning (04 Hrs)
Hamming networks
Simple competitive learning
Counter-propagation network
Adaptive resonance theory
Self organizing maps

Non-iterative procedures for association (04 Hrs)
Discrete Hopfield Network
Brain-State_in_a_box Network
Boltzmann Machine
Bi-directional Associate memory

MODULE 3

History and Motivation for Fuzzy Logic. (03 Hrs)
Classical sets
Fuzzy sets
Operations of Fuzzy sets
Properties of Fuzzy sets
A Geometric interpretation of Fuzzy sets
Possibility theory.

Fuzzy relations (02 Hrs)
Composition of Fuzzy relations
Fuzzy graphs and numbers
Functions with Fuzzy arguments
Arithmetic operations on Fuzzy numbers.

Basics of Fuzzy rules (05 Hrs)
Fuzzy mapping rules
Fuzzy implication rules
Fuzzy rule based models for function approximation
Theoretical foundation of fuzzy mapping rules
Types of fuzzy rule based models
Mamdani model
TSK model
Standard additive model.

MODULE 4

Propositional logic and first order predicate calculus. (05Hrs)
Fuzzy logic
- Fuzzy implication
- Approximate reasoning
- Criteria of Fuzzy implications
- Three families of Fuzzy implications

Possibility versus Probability
Probability of a Fuzzy event
Probabilistic interpretation of Fuzzy sets.

Fuzzy Logic in Expert Systems (05 Hrs)
Intelligent agents and Mobile robot navigation
Fuzzy Logic in Database systems
Fuzzy Relational Data models and operations
Fuzzy Object Oriented Database
Fuzzy Information Retrieval and Web search.

TEXT BOOK

6.Elements of Artificial Neural Networks by Kishan Mehrotra, Chilukuri Mohan, and Sanjay Ranka, ISBN: 81-900828-3-3, Penram International Publishing (India)

7.Fuzzy Logic, Intelligence, Control and Information by John Yen and Reza Langari, Pearson Education

REFERENCE BOOK

c) Neural Networks and Fuzzy Systems: A dynamical Systems Approach toi Machine Intelligence, by Bart Kosko, PHI
d) Neural Networks: A comprehensive Foundation, - By Simon Haykin, Pearson Education
e) Introduction to Artificial Neural Networks, - By Jacek M. Zurada, Jaico PublishingHouse
f) Neural Networks, Fuzzy Logic, and Genetic Algorithms Synthesis and Applications by S. Rajasekaran, G.A. Vijayalakshmi Pai, PHI
g) Foundation to Fuzzy sets and Fuzzy Logic by M. Ganesh, PHI

CE7.4.d.WT WEB TECHNOLOGY (Elective I)

Course Objectives

The purpose of this course is to provide students with a basic understanding of how things work in the web world. It will focus on the client-side implementation of web applications.

Instructional Objectives

At the end of this course,

1. Students will be familiarized with the fundamentals of Java programming and how to use Java to write applications.
2. Students will be equipped with the technical skills necessary to design, implement and deploy static and dynamic client-based web applications.

Lectures per Week	: (3 + 1 + 2)
Max Marks for Theory Paper	: 100
Max Marks for Sessionals	: 20 + 5
Max Marks for Oral	: 50
Duration of Paper	: 3 hrs
Total No of Modules	: 4
No. of Questions from each module	: 2
Total no. of questions to be answered	: 5

(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Core Java

Java Evolution Overview of Java and Concept of JVM Classes, objects and methods Array, Strings, Vectors	(03 Hrs)
Interfaces Packages Exception and Error handling	(02Hrs)
Thread Programming File Handling	(02 Hr)
Applet Programming Graphics Programming	(03 Hrs)

MODULE 2

Internet

Connecting to ISP (04 Hrs)
Web server
Web browser
Internet Protocols and Applications

AJAX Client (06 Hrs)

Introduction to XHTML
Cascading Style Sheets
JAVA Script: Introduction, Control statements, Functions, Arrays, Objects, DOM, Events

MODULE 3

XML

Comparison with HTML (06 Hrs)
XML Syntax
XML Attributes
XML Validation
XML DTD
XML document building blocks
DTD Elements
DTD Attributes
DTD Entities
DTD Validation
XSL Transformation
XML Namespaces
XML Schema

Flex 2 (02 Hrs)

Flex Platform Overview
Creating a simple User Interface
Accessing XML data from your Application
Interacting with Server-Side Applications
Customizing your User Interface
Creating Charts and Graphs

SilverLight (02 Hrs)

Platform Overview
Creating a Movie Viewer for SilverLight1.0
Embedding SilverLight in HTML
SilverLight Streaming
SilverLight Installation and overview
Creating a Cover Viewer for SilverLight 1.1Alpha
Rich Internet Application Client Technologies: Flex2,

MODULE 4

Server-Side Technologies (01 Hr)

Types of web pages, static, active dynamic
User session in E-commerce applications, Techniques for maintaining state information

Java servlets, JSP: lifecycle, implementation (04 Hrs)

Ruby on Rails (03 Hrs)

Ruby
Rails Framework
ActionController and ActionView
A Database-Driven Web Application
Case study: Message Forum

ASP.NET (03 Hrs)

Creating and Running a simple Web Form Example
Web Controls
Session Tracking
Case Study: Connecting to a database in ASP.NET

TEXT BOOKS:

1. Programming with Java by E. Balaguruswamy, TMH, ISBN: 978-0-07-061713-1
2. Web Technology – A Developer's Perspective by N.P. Gopalan, J. Akilandeswari, PHI, ISBN: 978-81-203-3276-8
3. Internet and WWW: How to Program by Deitel, Deitel, Goldberg, 4th Edition, ISBN:-978-81-317-2522-1

CE7.5.a .DC DATA COMPRESSION (Elective II)

Course Objective:

This course will focus on imparting knowledge about the conceptual and practical aspects of data compression with the required basic principles and mathematical preliminaries behind them.

Instructional Objective:

The student at the end of the course will be able to:

1. Describe the theory underlying basic techniques of data compression with detailed instruction for their applications using several examples to explain the concepts.
2. Encompass the entire field of data compression which includes Shannon-Fano coding, Huffman coding, arithmetic coding, dictionary techniques, sampling and quantization, and compression of video and still images

Lectures per Week : (3 + 1 + 0)
Max Marks for Theory Paper : 100
Max Marks for Sessionals : 20 + 5
Duration of Paper : 3 hrs
Total No of Modules : 4
No. of Questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Information and Coding (03 Hrs)
- Information and entropy
- Noiseless and memoryless coding

Shannon – Fano Coding (03 Hrs)
- Shannon coding
- Shannon – Fano Coding

Huffman coding (04 Hrs)
- Huffman coding with low memory requirements
- Adaptive Huffman coding

MODULE 2

Arithmetic coding (02 Hrs)
- Implementation of arithmetic coding

Dictionary Techniques (04 Hrs)
- The LZ77 technique
- The LZ78 Technique

Sampling and Quantization (04 Hrs)
- Sampling
- Quantization (Scalar and Vector)

MODULE 3

Predictive Coding (03 Hrs)
- Delta modulation (Adaptive and Delayed coding)
- Differential pulse code modulation

Transform Coding (04 Hrs)
- Defining a Transform
- Interpretation of transforms
- The Karhunun-Loeve transform
- The Hadamard transform
- The Discrete Fourier Transform
- The Discrete Cosine Transform
- The Discrete Wavelet Transform

Subband Coding (03 Hrs)
- Filters
- Downsampling and Upsampling
- Bit allocation

MODULE 4

Compression of Still Images: JPEG (05 Hrs)
- The Baseline System
- Progressive DCT- based mode of operation
- Hierarchical mode of operation
- Sequential lossless mode of operation JPEG 2000

Video Image Compression: MPEG (05 Hrs)
- MPEG-1
- MPEG2
- MPEG 4 and MPEG7

TEXT BOOK

1. Elements of Data Compression by Adam Drozdek, Thomson Brooks/Cole, ISBN:981-240-626-3

REFERENCE BOOKS

1. Introduction to DATA COMPRESSION by KHALID SAYOOD, ELSEIVIER , 2nd Edition, ISBN:81-8147-191-1.
2. Fundamental Data Compression by Ida Mengyi Pu, Butterworth-Heinemann.

CE7.5.b.GIS GEOGRAPHICAL INFORMATION SYSTEMS (Elective II)

Course Objectives:

This course is designed to provide the students an understanding of the basic concepts, procedures and applications of the exciting and rapidly expanding field of Geographical Information Systems.

Instructional Objectives:

At the end of the course, the students would be familiar with the following:

1. GIS Data Processing
2. Data Modeling
3. GIS Design Issues and Management

Lectures per Week : (3 + 1 + 0)
Max Marks for Theory Paper : 100
Max Marks for Sessionals : 20 + 5
Duration of Paper : 3 hrs
Total No of Modules : 4
No. of Questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Introduction to GIS (02 Hrs)

Introduction
Definition of GIS
Evolution of GIS
Component of GIS.

Functions and Characteristics of GIS applications
Contributing and Allied Disciplines

Maps and GIS (04 Hrs)

Map scale
Classes of map
Mapping process
Coordinate systems – plane and geographic
Map projection
Spatial framework for mapping locations – georeferencing
Topographic mapping
Attribute data for Thematic mapping

Digital Representation of Geographic data (04 Hrs)

Technical issues to digital representation of data
Database and Database management systems
Raster geographic data representation
Vector geographic data representation
Object representation and data analysis Relationship between Data representation and Data analysis.

MODULE 2

Data Quality and Standards (02 Hrs)

Concepts and definition of data quality
Component of geographic data
Data quality assessment
Spatial data error management
Geographic data standards
Geographic data standards and GIS development

Raster based GIS data processing (03 Hrs)

Introduction
Acquiring and Handling raster geographic data
Raster based GIS data analysis
Output functions of raster data processing
Cartographic modeling

Vector based GIS data processing (05 Hrs)

Introduction
Characteristics of vector based GIS data processing
Vector data input functions
Non topological GIS analysis functions
Feature based topological functions
Layer based topological functions
Vector based output functions
Application programming

MODULE 3

Visualization of Geographic Information and Generation of Information Products (05 Hrs)

Introduction
Cartography in GIS context
Human computer interaction and GIS
Visualization of geographic information
Principles of Cartographic design in GIS
Generation of information product.

Data Modeling (05 Hrs)

Digital Terrain Modeling
- Approaches to digital terrain data modeling
- Acquisition of digital terrain data
- Data processing, Analysis and visualization
- Applications of digital terrain models

Spatial modeling
- Descriptive statistics
- Spatial autocorrelation
- Quadrant counts and Nearest-Neighbor analysis
- Trend surface analysis
- Gravity models
- Network analysis
- GIS modeling

MODULE 4

GIS Modeling (02 Hrs)
- Binary Models
- Index Models
- Regression Models
- Process Models

GIS Project Design And management (04 Hrs)
- Software engineering as applied to GIS
- GIS project planning
- System analysis and study of user requirement
- Geographic database design methodology
- GIS application software design methodology
- System implementation and technology rollout
- System maintenance and support

GIS issues And Future of GIS (04 Hrs)
- Issues of implementation
- Trend of GIS development
- GIS applications and GIS users

TEXTBOOKS:

a. Concepts and Techniques of Geographic Information Systems by C.P. La, Albert K.W. Yeung, PHI, ISBN:81-203-2230-4

REFERENCE BOOKS:

1. Introduction to Geographic Information Systems by Kang-Tsung Chang, TMH, ISBN:0-07-049552-1
2. An Introduction to Geographical Information System by Lan Heywood, Sarah Cornelius, Steve Carver, Person Education, ISBN:81-7808-541-0

CE7.5.c.BI BIO INFORMATICS (Elective II)

Course objectives :

This course aims at providing an introduction to bioinformatics to interpret the rapidly expanding amount of biological information. It discusses the basic concepts of bioinformatics and focuses on how to identify, obtain, establish, maintain and exchange research information in biology. The objective is to examine the structure and function of genes and proteins through the use of computational analysis, statistics, and pattern recognition. It discusses Pattern Representation, Characterization and Discovery in Proteins.

Instructional Objectives

After completing this course students will learn the following:

1. Molecular bioinformatics concepts
2. Genome Analysis and Gene Mapping
3. Current bioinformatics tools and databases
4. Dynamic programming for sequence alignment
5. Concepts of Sequence Analysis
6. Analysis, Visualization and representation of Molecular Structure
7. Learn the key methods and tools used in bioinformatics
8. Applications of bioinformatics in genomics

Lectures per Week : (3 + 1 + 0)
Max Marks for Theory Paper : 100
Max Marks for Sessionals : 20 + 5
Duration of Paper : 3 hrs
Total No of Modules : 4
No. of Questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Bioinformatics – an Introduction (03 Hrs)

Introduction
Historical Overview and Definition
Bioinformatics applications
Major databases in Bioinformatics,
Data Management and Analysis
Molecular Biology and Bioinformatics
Central Dogma of Molecular Biology

Information Search and Data Retrieval (01 Hr)

Introduction
Tools for web search
Data Retrieval Tools
Data Mining of biological databases.

Genome Analysis and Gene Mapping (06 Hrs)

Introduction
Genome Analysis
Gene Mapping
The Sequence Assembly Problem
Genetic Mapping and Linkage Analysis
Physical Maps
Cloning Entire Genome
Genome Sequencing
Applications of Genetic Maps
Sequence Assembly Tools
Identification of Tools in Contigs
Human Genome Project

MODULE 2

Sequence Alignment (03 Hrs)

Introduction
Dot matrices and Hash coding
Dynamic programming in sequence algorithm
BLAST
FASTA

Multiple Alignment, Substitution Matrices and Phylogenetic Trees (04 Hrs)

Multiple sequence alignment
Substitution matrices
Phylogenetic trees

Protein and DNA Sequence Analysis (03 Hrs)

Pattern Representation and Characterization
Pattern Discovery and Sequence Classification in Proteins and Nucleic Acids

MODULE 3

Determination and Analysis of Molecular Structures (05 Hrs)

Experimental structure determination technique
Visualization and representation of molecular structure
Geometrical analyses of structures
Structure comparisons

Protein Structure Prediction and Protein Folding (03 Hrs)

Protein Secondary Structure Prediction
Protein tertiary Structure prediction

Nucleic Acid Structure (02 Hrs)

RNA structure prediction
DNA Structural Polymorphism

MODULE 4

Gene Expression and Microarrays (05 Hrs)

Introduction
Working with DNA microarrays.
Clustering Gene Expression Profiles
Data sources and tools for microarrays analysis
Applications – Functional Genomes
Comparative Genomics
Medical Applications
Microarrays in Pharmaceutical industries
DNA Microarrays

Protein Classification and Structure Visualisation (05 Hrs)

Introduction
Overview of protein structure
Protein Structure Visualisation
Structure based protein classification
Protein Structure databases
Protein Structure Visualisation Database and Tools
Protein Structure Alignment
Domain Architecture Databases
Tools for Plotting Protein-Ligand Interaction
Protein Classification Approach

TEXT BOOKS

1. Bioinformatics – Methods and Applications, by S.C. Rastogi, N. Mendiratta and P. Rastogi, 3rd Edition, PHI. ISBN: 978-81-203-3595-0 {Text Book for Module I and Module IV}
2. Bioinformatics-Databases and Algorithms, by N.Gautham, Narosa Publication ISBN: 81-7319-715-6 {Text Book for Module II and Module III}

REFERENCE BOOKS:

1. Bioinformatics- A Beginner's Guide, by Jean-Michel Claveriw, Cerdric Notredame WILEY dreamlech India Pvt. Ltd ISBN: 8126503807
2. Introduction to Bioinformatics, by Arthur M. Lesk, OXFORD publishers (Indian Edition) ISBN: 0199580790
3. Introduction to Bioinformatics, by T K Attwood & D J Parry-SmithAddison Wesley Longman ISBN: 8177586416

CE7.5.d.PMQA PROJECT MANAGEMENT AND QUALITY ASSURANCE (Elective II)

Course objectives:

This course on Project Management and Quality Assurance aims to provide the students a deeper knowledge on the elements required for quality project management.

Instructional Objectives:

After completing this course students will be able to:

1. Select an appropriate project team
2. Gather the requirements of the project
3. Plan the project
4. Know how a project is to be divided in the team
5. Assign Resources
6. Schedule the work
7. Learn about Software Metrics and Testing
8. Know Post Performance Analysis
9. Know Software Quality Assurance
10. Know Software Configuration Management

Lectures per Week : (3 + 1 + 0)
Max Marks for Theory Paper : 100
Max Marks for Sessionals : 20 + 5
Duration of Paper : 3 hrs
Total No of Modules : 4
No. of Questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Introduction (02 Hrs)

Surveying the Foundations
Some other useful definitions
Product Development Techniques
Project Management Skills

Selecting a Project Team (03 Hrs)

The Whole is the sum of the Parts
Parts need to Work Together
Working together requires a framework
Providing the Total Solution

Defining Goal and Scope of the Software Project (02 Hrs)

Project Planning
"The Goal"
Scope of Work
Project Charter
The Software Project Management Plan

Creating the Work Breakdown Structure (02 Hrs)

Work Breakdown Structure
Approaches to Building a WBS
Defining Project Milestones
Creating Work Packages
Building a WBS for Software

Identifying the Tasks and Activities (02 Hrs)

Characteristics of Tasks and Activities
The Activity ID Process

MODULE 2

Software Size and Reuse Estimating (02 Hrs)

Problems and Risks with Estimating Software Size
Getting Started with Software sizing: Estimating Begins with Planning
The Effects of Reuse on Software Size

Estimating Duration and Cost (02 Hrs)

Effort Measures
The Steps in Estimating
COCOMO: A Regression Model
COCOMO II, SLIM: A Mathematical Model

Assigning Resources (02 Hrs)

Organizational Planning
Identifying and Documenting the Project Roles and Skills Needed
Assigning Responsibilities to Individuals
Establishing Reporting Relationships
Project Management Resource Activities During Execution

Scheduling the work (02 Hrs)

Why Schedule
The uncertanity of Scheduling the Future
Scheduling Fundamentals
PERT and CPM scheduling
Leveling Resource Assignments
Map the Schedule to a Real Calender
Critical Chain Scheduling

Eliciting Requirements (02 Hrs)

What is Software Requirement
What makes a “Good” Software Requirement
Requirement Elicitation Methods
Guidelines for writing Quality Requirements
Challenges in Eliciting Requirements,

Developing the Software Requirement Specification (02 Hrs)

Questions the SRS Answers for a Project
Benefits of an SRS
Buiding the SRS
Evaluating the Project SRS

MODULE 3

Reliability (02 Hrs)

Software Reliability Terminology
Fault Forecasting
Fault Prevention
Fault Removal
Fault Tolerance
Reliability Tools
Software Reliability Plan

Software Metrics (02 Hrs)

What is a Metric
The Importance of Metrics to Software Projects
Useful Metrics
A "Basic Metrics" starter Set
Measuring Aspects of Software Quality

Validation and Verification (02 Hrs)

Static Testing: Reviews
Dynamic testing
User Acceptance and Usability Testing
The Ideal Test Coverage

Project Tracking and Control (02 Hrs)

Control Systems
Scope Management
Schedule Management
Cost Management
Quality Management
Progress Management
Risk Management

Continuous Process Improvement (02 Hrs)

Maturity Level Process Characteristics
Waste in the Software Development Organization
Six-Step Software Development Process Improvement Model
Applying the Software Development Process Improvement Model

Project Termination (01 Hr)

Why Terminate?
Types of Termination
What to do upon Project Termination
Termination Process

MODULE 4

Post-Performance Analysis (01 Hr)

What's in a Name?
How to conduct a PPA

Software Quality Assurance (02 Hrs)

Building the Software Quality Assurance Plan
Ensuring the SQAP

Software Configuration Management (02 Hrs)

What is Software Configuration Management?
Why is SCM important?
Who is Involved in SCM?
How can Software Configuration Be Implemented in your Organization?
SCM Principles,
The Four Basic Requirements for an SCM system,
Planning and Organizing for SCM,
SCM Tools,
Benefits of SCM Process and Tools,
Some Problems with Software

Reporting and Communicating (02 Hrs)

Effective Communication,
Communicating with Teams,
Communication and Motivation Skills of a Software Project manager,
Project manager Behaviour that Motivates,
Project Reporting

Use of Tools (02 Hrs)

Software Requirements Tools
Software Design Tools
Software Construction Tools
Software Testing Tools
Software Maintenance Tools
Software Configuration Management Tools
Software Engineering Process Tools
Software Quality Tools
Software Engineering Management Tools
Infrastructure Support Tools
Miscellaneous Tools Issues
Minimal Tool Sets

TEXT BOOK

1. Quality Software Project Management by Robert T. Futrell, Donald F. Shafer, Linda I. Shafer, Pearson Education, ISBN:81-7808-767-7

CE8.1ADSA ADVANCED DATA STRUCTURES & ALGORITHMS

Course objectives:

Advanced Data structures and algorithms are the building blocks in computer programming. This course will give students a comprehensive introduction of advanced data structures, and algorithms design.

In this course we aim to provide students with a deeper understanding of Advanced data Structure and algorithms. In particular we focus on the principles, techniques, and practices relevant to the design and implementation of advanced data structures and algorithms

Concretely the course has the following objectives:
Study in depth and implement different advanced data structure concepts and also learn, efficient parallel and probabilistic algorithms, and learn techniques for designing algorithms using appropriate data structures.

Instructional Objectives

After completing this course students will be able to:

- Have understanding of advanced data structure concepts in depth
- Understand various implementations and operations on advanced data structure concepts like trees, heaps, tries, digital trees etc.
- Understand different types of parallel and probabilistic algorithms.

Lectures per week : (3 + 1 +2)
Max marks for theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for Orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Dynamic Hashing (02 Hrs)

Motivation for Dynamic Hashing
Dynamic Hashing Using Directories
Analysis of Directory-Based Dynamic Hashing
Directoryless Dynamic Hashing

Min-Max Heaps (03 Hrs)

Definitions
Insertion into Min-Max heap
Deletion of Min element

Deaps (03 Hrs)

Definition
Insertion into Deap
Deletion of the Min element
Leftist Trees

Binomial Heaps

Cost Amortization (03 Hrs)
Definition
Insertion into binomial heap
Combining two binomial heap
Deletion of Min Element
Analysis

MODULE 2

Fibonacci Heaps (03 Hrs)
Definitions
Deletions
Decreasing key
Cascading cut
Analysis

Search structures (04 Hrs)
Optimal Binary Search Trees
AVL trees
2-3 Trees
2-3-4 Trees

Red –Black Trees (04 Hrs)
Definition and properties
Searching
Insertion
Deletions
Joining and splitting

MODULE 3

B-Trees (04 Hrs)
Definitions of m-way search trees
Searching an m-way search trees
Definitions and properties of B-tree
Insertion into B-tree
Deletion from b-tree

Splay Trees (01 Hr)
Digital search trees (03 Hrs)
Definition
Binary tries
Patricia

Tries (03 Hrs)
Definitions
Searching
Insertions
Deletions
Node structure

Differential files (01Hr)

The concept
Bloom Filters

MODULE 4

Introduction to parallelism models (04 Hrs)

Simple algorithms for parallel computers.
CRCW and EREW algorithms
Brent's theorem and work efficiency

Probabilistic Algorithms: (04 Hrs)

Introduction
Expected versus average time
Pseudorandom generation,
Buffon's needle numerical integration,
Probabilistic counting,
Monte Carlo algorithms

TEXT BOOKS:

1. Fundamentals of data structures in c++ by Ellis Horowitz,Sartaj Sahni, Dinesh Mehta, Galgotia Publication, ISBN: 817515-278-8
2. Computer Algorithms – Saar Baase. PHI , ISBN: 0201612445

REFERENCES BOOKS:

1. Graph Theory with application to engineering and computer science by Deo Narsingh, Charles E Millican. MGh, PHI, ISBN: 978-81-203-0145-0
2. Fundamentals of Algorithms by Gilles Brassard and Paul Bratly. PHI, ISBN: 9780133350685.
3. Computer Algorithms by Horowitz, Sartaj Sahni. Rajasekharan – Galgotia, ISBN: 9788175152571
4. Introduction to algorithms by Thomas H cormen, Charles E Leiserson, Ronald L Rivest. PHI, ISBN: 81-203-1353-4

CE8.2CCNS COMPUTER CRYPTOGRAPHY AND NETWORK SECURITY

Course Objective:
To understand the principles of encryption algorithms, conventional and public key cryptography. To have a detailed knowledge about authentication, hash functions and application level security mechanisms.

Instructional Objectives:

- To know the methods of conventional encryption
- To understand the concepts of public key encryption and number theory
- To understand authentication and hash functions
- To know network security tools and applications
- To understand system level security issues.

Lectures per week : (3 + 1 +2)
Max marks for theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for Orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Symmetric Ciphers

Introduction (01 Hr)
- Services, mechanisms and attacks
- The OSI Security Architecture
- Model for Network Security

Classical Encryption Techniques (2.5 Hrs)
- Symmetric Cipher Model
- Substitution Techniques
- Transposition Techniques
- Rotor Machine
- Steganography

Block Ciphers and Data Encryption Standard (03 Hrs)
- Simplified DES
- Block Cipher Principles
- The Data Encryption Standard
- Block Cipher Design Principles
- Block Cipher Modes of Operation

Contemporary Symmetric Ciphers (1.5 Hrs)
- Triple DES
- Blow fish

Confidentiality Using Symmetric Encryption (02 Hrs)
- Placement of Encryption Function
- Traffic Confidentiality
- Key Distribution
- Random Number Generators

MODULE 2

Public Key Encryption and Hash Functions

Introduction to Number Theory (1.5 Hrs)
- Prime Numbers
- Fermat's and Euler's Theorems
- Testing for Primality
- Euclid's Algorithm.

Public Key Cryptography and RSA (2.5 Hrs)
- Principles of Public Key Cryptosystems
- The RSA Algorithm

Key Management (02 Hrs)
- Key Management
- Deffie-Hellman Key Exchange.

Message Authentication and Hash Functions (2.5 Hrs)
- Authentication Requirements.
- Authentication Functions
- Message Authentication Codes
- Hash Functions

Hash Algorithms (1.5 Hrs)
- MD5- Message Digest Algorithm
- Secure Hash Algorithm

MODULE 3

Public Key Encryption and Hash Functions (Continued)

Digital Signatures and Authentication Protocols (2.5 Hrs)
- Digital Signatures
- Authentication protocols
- Digital Signature Standard

Network Security

Authentication Applications (2.5 Hrs)
- Kerberos
- X.509 Authentication Service

Electronic Mail Security (2.5 Hrs)
- Pretty Good Privacy
- S/MIME

IP Security (2.5 Hrs)

IP Security Overview
IP Security Architecture
Authentication Header
Encapsulating Security Payload
Combining Security Associations
Key Management

MODULE 4

Network Security (Continued)

Web Security (03 Hrs)

Web Security Considerations
Secure Sockets Layer and Transport Layer Security
Secure Electronic Transaction.

System Security

Intruders (03 Hrs)

Intruders
Intrusion Detection
Password Management

Malicious Software (02 Hrs)

Viruses and related threats
Virus counter measures

Firewalls (02 Hrs)

Firewall Design Principles
Trusted Systems.

TEXT BOOKS:

1. Cryptography and Network security 4th ed. William Stallings PEA, ISBN:978-81-7758-774-6

REFERENCE BOOKS:

1. Internet Cryptography by Richard E Smith, Pearson Education Asia, ISBN:81-297-0351-3
2. Building Internet Firewalls by Chapman D., E. Zwicky, O'Reilly 1995, ISBN:81-7366-101-4
3. Network Security Essential: Applications and Standards by William Stallings, PEA, ISBN:81-7808-307-8
4. Network Security, Private Communication in a Public World by Charlie Kaufman, Radia Perlman, Mike Speciner PTR Prentice Hall, 1995, ISBN:978-81-203-2213-4

CE8.3.a.ESD EMBEDDED SYSTEM DESIGN (Elective III)

Course Objectives:

The main objective of this course is to provide the student with the basic understanding of embedded systems design. This includes system requirements specifications, architectural and detailed design, and implementation, focusing on real-time applications.

Instructional Objectives:

At the end of this course student will be exposed to microcontroller-based embedded systems design, development and implementation. It includes embedded systems and its hardware organization, microcontroller architecture, programming, I/O interfacing and Real Time operating System

Lectures per week : (3 + 1 +2)
Max marks for theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for Orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Introduction to Embedded System (05 Hrs)

An Embedded system
Processor in the system
Other hardware Units
Software Embedded into a System
Exemplary Embedded Systems
Embedded System-on-Chip (SOC) and in VLSI Circuit

Processor and Memory Organization (05 Hrs)

Structural Units in a Processor
Processor selection for an Embedded System
Memory Devices
Memory Selection for an Embedded System
Allocation of Memory to Program segments and Blocks and Memory map of a System
Direct Memory Access
Interfacing Processor, Memories and I/O Devices

MODULE 2

8051 Microcontroller (10 Hrs)

Introduction to Microcontrollers
Architecture and Pin Description of 8051
8051 ALP
I/O Port Programming
Addressing Modes
Arithmetic Logic Instructions and Programs
8051 Programming in C

MODULE 3

8051 Programming (10 Hrs)

8051 Timer Programming in Assembly and C
8051 Serial Port Programming in Assembly and C
Interrupt Programming in Assembly and C
LCD and Keyboard Interfacing using 8051

MODULE 4

Real Time Operating System (10 Hrs)

Operating System services
I/O subsystems
Network Operating Systems
Real Time and Embedded System Operating systems
Interrupt Routines in RTOS environment : Handling of Interrupt source call by the RTOSs
RTOS Task scheduling Models, Interrupt Latency and Response Times of the Tasks as Performance Metrics
Performance Metric in Scheduling Models for Periodic, Sporadic and Aperiodic Tasks.
IEEE standard POSIX 1003.1B Functions for standardization of RTOS and Inter-Task Communication functions
List of basic Actions in a preemptive Scheduler and Expected times taken at a processor
Fifteen Point Strategy for Synchronisation between the Processes, ISRs, OS Functions and Tasks and for Resource Management
Embedded Linux Internals: Linux Kernel for the Device Drivers and Embedded System
OS Security Issues
Mobile OS

TEXTBOOKS

1. Embedded Systems –Architecture, Programming and design by Raj kamal, Tata Mcgraw Hill Publishing Company Limited, ISBN:0-07-049470-3
2. The 8051 Microcontroller and Embedded Systems by Muhammad Ali Mazidi and Janice Mazidi, Pearson Education, ISBN:81-7808-574-7

REFERENCE BOOKS:

1. The 8051 Microcontroller, Architecture, Programming & Applications-Second edition by Kenneth J. Ayala, Penram International, ISBN:81-900828-4-1
2. Programming and Customizing the 8051 Microcontroller by Myke Predko, TMH, ISBN:0-07-042140-4

CE8.3.b.MS MULTIMEDIA SYSTEMS (Elective III)

Course Objective:

Multimedia has become an indispensable part of modern computer technology. In this course, students will be introduced to principles and current technologies of multimedia systems. Issues in effectively representing, processing, and retrieving multimedia data such as sound and music, graphics, image and video will be addressed. The aim of this course is to help students develop an understanding of the fundamental principles of multimedia systems and how they are being developed and applied and also to gain an intuitive understanding of multimedia concepts.

Instructional Objectives:

At the end of the course , the student will be familiar with properties of multimedia systems, video and animation, data compression techniques and the various multimedia applications.

Lectures per week : (3 + 1 +2)
Max marks for theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for Orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Introduction to Multimedia (02 Hrs)

Branching-overlapping aspects of Multimedia
Global Structure

Multimedia : Media and Data Streams (03 Hrs)

Medium
Main properties of a Multimedia System
Multimedia
Data Stream Characteristics for Continuous Media

Sound/Audio (02 Hrs)

Basic Sound Concepts
Music
Speech

Video and Animation (03 Hrs)

Basic concepts
Television
Computer-based Animation

MODULE 2

Data Compression (04 Hrs)

Some Basic Compression Techniques
JPEG
H.261
MPEG
DVI

Computer Technology (03 Hrs)

Communication Architecture
Multimedia Workstation

Multimedia Operating Systems (03 Hrs)

Introduction
Real time systems
File Systems

MODULE 3

Multimedia Communication Systems (03 Hrs)

Application Subsystem
Transport Subsystem
Quality of Service and Resource Management

Database Systems (04 Hrs)

Multimedia Database Management Systems
Characteristics of an MDBMS
Data Analysis
Data Structure
Operations on Data
Integration in a Database Model

Documents Hypertext and MHEG (03 Hrs)

Documents
Hypertext and Hypermedia
Document Architecture SGML
Document Architecture ODA
MHEG

MODULE 4

User Interfaces (03 Hrs)

General Design Issues
Video at the User Interface
Audio at the User Interface
User-friendliness as the Primary Goal.

Synchronization (03 Hrs)

Introduction
Notion of synchronization
Presentation Requirements
A Reference Model for Multimedia Synchronization
Synchronization Specification

Multimedia Applications (04 Hrs)

Introduction
Media Preparation
Media Composition
Media Integration
Media Communication
Media Consumption
Media Entertainment

TEXT BOOKS:

1. Multimedia: Computing, Communications and Applications by Ralf Steinmetz and Klara Nahrstedt, Pearson Education, ISBN:81-7808-319-1

REFERENCE BOOKS:

1. Multimedia Systems, by John F. Koegel Buford, Pearson Education, ISBN: 81-7808-162-8
2. Multimedia: Making it Work, by Tay Vaughan, TMH, ISBN: 0-07-047276-9
3. Principles of Interactive Multimedia, by Mark Elsom-Cook, TMH, ISBN: 978-0-07-058833-2

CE8.3.c.DOS DISTRIBUTED OPERATING SYSTEMS (Elective III)

Course Objectives:

This course has as a first objective to introduce the basic concepts upon which distributed systems at large and distributed operating systems in particular rely. The overall architecture of distributed systems along with their different components is then studied in depth, with a focus on design issues, design problems, solutions and performance issues.

Concretely the course has the following objectives:

- Present the principles underlying the functioning of distributed systems.
- Create an awareness of the major technical challenges in distributed systems design and implementation.
- Expose students to past and current research issues in the field of distributed systems.
- Provide experience in the implementation of typical algorithms used in distributed systems.

Instructional Objectives:

After completing this course students will be able to:

- Explain what a distributed system is, why you would design a system as a distributed system, and what the desired properties of such systems are.
- List the principles underlying the functioning of distributed systems, describe the problems and challenges associated with these principles, and evaluate the effectiveness and shortcomings of their solutions.
- Recognize how the principles are applied in contemporary distributed systems, explain how they affect the software design, and be able to identify features and design decisions that may cause problems.

Lectures per week : (3 + 1 +2)
Max marks for theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for Orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Introduction to distributed operating systems: (05 hrs)

What is a distributed operating system?
Goals
Hardware Concepts
Software Concepts
Design Issues

Communication in distributed systems (06 Hrs)

Layered Protocols
Asynchronous Transfer Mode Networks
The Client-Server Model
Remote Procedure Call
Group Communication

MODULE 2

Synchronization in Distributed Systems (06 Hrs)

Clock Synchronization
Mutual Exclusion
Election Algorithms
Atomic Transactions
Deadlocks in Distributed Systems

Processes and Processors in Distributed Systems (03 Hrs)

Threads
System Models

MODULE 3

Processes and Processors in Distributed Systems (contd.) (05 Hrs)

Processor Allocation
Scheduling in Distributed Systems

Distributed File Systems (05 Hrs)

Distributed File System Design
Distributed File System Implementation
Trends in Distributed File Systems

MODULE 4

Case Study of Distributed Systems (05 Hrs)
Case study 1: AMOEBA

Introduction
Objects and capabilities
Process management
Memory management
Communication
Amoeba Servers

Case study 2: Distributed Computing Environment (05 Hrs)

Introduction
Threads
RPC
Time Service
Directory Service
Security Service

TEXT BOOKS:

1. Distributed Operating Systems by A.S. Tanenbaum, Pearson Education, ISBN:81-7758-179-1.

REFERENCE BOOKS:

1. Distributed Systems: Concepts and Design by G. Coulouris, J. Dollimore and T. King Berg., Addison Wesley, ISBN:81-7808-462-7
2. Advanced Concepts in Operating Systems by M. Singhal and N. G. Shivaratri, TMH, ISBN:0-07-047268-8

CE8.3.d.DM DATA MINING (Elective III)

Course Objective:

This course will focus on imparting a complete introduction to data mining for students. It will provide a sound understanding of the foundations including fundamental concepts and algorithms of data mining.

Instructional Objective:

The student at the end of the course will be able to:

- Describe the theory underlying the fundamental techniques and concepts of data mining with detailed instruction for their applications by illustrating the concepts with examples and simple descriptions of key algorithms.
- Understand and encompass the field of data mining which includes data, classification, association analysis, and clustering and anomaly detection.

Lectures per week : (3 + 1 +2)
Max marks for theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for Orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Introduction (04 Hrs)

Challenges
Origin of Data Mining
Data Mining Tasks

Data (06 Hrs)

Types of Data
- Attributes and Measurement
- Types of Data Sets

Data Quality
- Measurement and Data Collection Issues
- Issues Related to Applications

Data Preprocessing
- Aggregation
- Sampling
- Dimensionality Reduction
- Feature Subset Selection
- Feature Creation
- Discretization and Binarization
- Variable Transformation

Measures of Similarity and Dissimilarity
- Similarity and Dissimilarity between Simple Attributes
- Dissimilarities between Data Objects
- Similarities between Data Objects
- Examples of Proximity Measures
- Issues in Proximity Calculation
- Selecting the Right Proximity Measures

MODULE 2

Exploring Data (05 Hrs)

Summary Statistics
- Frequencies and the Mode
- Percentiles
- Measures of Location: Mean and Median
- Measures of Spread: Range and Variance
- Multivariate Summary Statistics
- Other Ways to Summarize the Data

Visualization
- Motivations for Visualization
- Techniques
- Visualizing Higher-Dimensional Data

OLAP and Multidimensional Data Analysis
- Representation of Multidimensional Data
- Analyzing Multidimensional Data

Classification: Basic concepts, Decision Trees, and Model Evaluation (05 Hrs)

General Approach to Solving a Classification Problem

Decision Tree Induction
- Working
- Construction
- Methods for Expressing Attribute Test Conditions
- Measures for Selecting the Best Split
- Algorithm and Characteristics for Decision Tree Induction

Model Overfitting
- Overfitting Due to Presence of Noise
- Overfitting Due to Lack of Representative Samples
- Overfitting and the Multiple Comparison Procedures
- Estimation of Generalization Errors
- Handling Overfitting in Decision Tree Induction

MODULE 3

Classification: Alternative Techniques (05 Hrs)

- Rule-Based Classifier
  - Concept
  - Rule-Ordering Schemes
  - Building a Rule-Based Classifier
  - Direct Methods for Rule Extraction
  - Indirect Methods for Rule Extraction
  - Characteristics of Rule-Based Classifiers
- Nearest-Neighbor classifiers
  - Algorithm
  - Characteristics of Nearest-Neighbor Classifiers

Association Analysis: Basic Concepts and Algorithms (05 Hrs)

- Frequent Itemset Generation
  - The Apriori Principle
  - Frequent Itemset Generation in the Apriori Algorithm
  - Candidate Generation and Pruning
  - Support Counting
  - Computational Complexity
- Rule Generation
  - Confidence-Based Pruning
  - Rule Generation in Apriori Algorithm
  - An Example: Congressional Voting Records
- Compact Representation of Frequent Itemsets
  - Maximal Frequent Itemsets
  - Closed Frequent Itemsets
- Alternative Methods for Generating Frequent Itemsets

MODULE 4

Cluster Analysis: Basic Concepts and Algorithms (05 Hrs)

- Overview
- K-means
  - The Basic K-means Algorithm
  - K-means: Additional Issues
  - Bisecting K-means
  - K-means and Different Types of Clusters
  - Strengths and Weaknesses
  - K-means as an Optimization Problem
- Agglomerating Hierarchical Clustering
  - Basic Agglomerative Hierarchical Clustering Algorithm
  - Specific Techniques
  - The Lance-Williams Formula for Cluster Proximity
  - Key Issues in Hierarchical Clustering
  - Strengths and Weaknesses

Anomaly Detection (05 Hrs)

Preliminaries
Statistical Approaches
Detecting Outliers in a Univariate Normal Distribution
Outliers in a Multivariate Normal Distribution
A Mixture Model Approach for Anomaly Detection
Strengths and Weaknesses
Proximity-Based Outlier Detection
Strengths and Weaknesses
Density-Based Outlier Detection
Detection of Outliers Using Relative Density
Strengths and Weaknesses
Clustering-Based Techniques
Assessing the Extent to Which an Object Belongs to a Cluster
Impact of Outliers on the Initial Clustering
The Number of clusters to Use
Strengths and Weaknesses

TEXT BOOK

1. Introduction to Data Mining by Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education, ISBN:81-317-1472-1

REFERENCE BOOK

1. Data Mining - Concepts and Techniques by Jiawei Han and Micheline Kamber, Elsevier, Second Edition, Original ISBN: 978-1-55860-901-3, Indian Reprint ISBN: 978-81-3120535-8

CE8.3.e.WS WEB SERVICES (Elective III)

Course Objective:

To learn and understand the various concepts of Web Services. Students will first learn basics of XML which is the basic prerequisite to understand how the different documents of the respective protocols are designed. Then they will learn the different protocols used in web services and their role and importance in designing a web service.

Instructional Objective:

Students completing the course will be able to understand to the methods of developing the web services within real world enterprise environments.
Students will gain knowledge of

- How information is exchanged between applications within a distributed environment. (SOAP).
- How the web services are described to the world over internet (WSDL).
- How the web service is published and made known to the world over the internet. (UDDI).
- How to explain the conversation pattern that a web service is expecting to engage in. (WSCL)
- How workflow systems automate business processes. (Workflow).
- Advantages and Disadvantages of Web Services.
- Transactions and the transaction protocols used in web service.
- Security issues in Web Services

Lectures per week : (3 + 1 +2)
Max marks for theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for Orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Web Services Basics: (01 Hr)

What Are Web Services?
Why Web Services Are Important?

Comparing Web services to the other Technologies

Extensible Markup Language (XML): (04 Hrs)

XML Fundamentals
XML Profile
XML DTD and XSL
XML Schema
XML Documents

XML Namespaces
Processing XML
SAX
DOM
XSLT and XPATH

Simple Object Access Protocol (SOAP):
SOAP Basics (05 Hrs)

SOAP messages
SOAP Envelope
SOAP Header
SOAP Body
SOAP Faults
SOAP Encoding
SOAP RPC
Using alternative SOAP Encodings
Document, RPC, Literal, Encoded
SOAP, Web services, and the REST Architecture.

MODULE 2

Web Service Description Language (WSDL): (05 Hrs)

WSDL Structure
The Stock Quote WSDL Interface
The Types Element
Message Elements
Bindings
Services
Managing WSDL Descriptions
Extending WSDL
Using SOAP and WSDL

Universal Description, Discovery and Integration (UDDI): (05 Hrs)

UDDI at a Glance
Analogies with Telephone Directories
The UDDI Business Registry
UDDI under the Covers
Accessing UDDI
How UDDI is Playing Out

MODULE 3

Web Service Conversation Language (WSCL): (05 Hrs)

Conversations
Conversations Overview
Web Services Conversation Language
WSCL Interface Components
The Bar Scenario Conversation
Relationship between WSCL and WSDL

Workflow (03 Hrs)

Business Process Management
Workflows and Workflow Management Systems
Business Process Execution Language for Web Services (BPEL)

Advantages of Web Services (02 Hrs)
Disadvantages and Pitfalls of Web Services

MODULE 4

Transaction (05 Hrs)

ACID Transactions
Distributed Transactions and Two-Phase Commit
Dealing with Heuristic Outcomes
Scaling Transactions to Web Services
Web Services Transaction Protocols

Security (04 Hrs)

Everyday Security Basics
Security Is an End-to-End Process
Web Service Security Issues
Types of Security Attacks and Threats
Web Services Security Roadmap
WS-Security

Web Services in the real World (01 Hr)

TEXT BOOKS:

1. Developing Enterprise Web Services – An Architect's Guide by Sandeep Chatterjee and James Webber, Pearson Education, ISBN: 0-13-140160-2
2. Sams Teach Yourself Web Services in 24 Hours by Stephen Potts and Mike Kopack, Sams Publications, ISBN:13:978-0672325151

REFERENCE BOOKS:

1. Web Services A Technical Introduction BY Deitel and Deitel, Prentice Hall, ISBN:0130461350
2. Web Services An Introduction By B. V. Kumar and S.V. Subrahmanya, TMH, ISBN:13-978-0070593787.

CE8.4.a.GA GENETIC ALGORITHM (Elective IV)

Course Objective:

The aim of the course is to introduce genetic algorithms and to give students an insight into the various types of algorithms and their industrial applications. The course will help them to be able to assess the suitability of genetic algorithms for specific problems.

Instructional Objective:

To familiarize students with genetic and evolutionary computation techniques and to enable them to read the literature and solve practical problems of their choosing.

Lectures per week : (3 + 1 +2)
Max marks for theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for Orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Genetic Algorithms (04 Hrs)

Definition
Robustness of traditional optimization and search techniques
Goals of optimization
A Simple Genetic Algorithm
Similarity Templates

Mathematical Foundations (08 Hrs)

Fundamental theorem
Schema Processing
Problem solving-2 armed and K armed bandit problem
Building block hypothesis
Minimal deceptive problem
Similarity templates as hyper planes

MODULE 2

COMPUTER Implementation Of Genetic Algorithms (06 Hrs)

Data structure, reproduction, crossover and mutation
Mapping objective functions to fitness form
Fitness scaling, discretization and constraints

Applications Of Genetic Algorithms (06 Hrs)

DeJong and Function optimization structural optimization via genetic algorithm
Medical image registration with genetic algorithms
Iterated prisoner's dilemma problem..

MODULE 3

Advanced Operators And Techniques In Genetic Algorithm Search (08 Hrs)

Dominance, Diploidy and abeyance
Inversion and other re-ordering operators
Macro operators, niche and special speciation
Multi objective optimization
Knowledge based techniques
Genetic Algorithms and Parallel processors
Genetic Based machine learning
Classifier systems

MODULE 4

Industrial Application Of Genetic Algorithms (08 Hrs)

Data mining using genetic Algorithms
Search in data mining
Genetic algorithms for game playing eg TIC TAC TOE

TEXT BOOKS:

1. Genetic Algorithms in search, optimization machine leaning - David Goldberg 6th edition , ISBN No-81-7808-130-X
2. Industrial applications of Genetic Algorithms- Charles L Karr and L.Michael Freeman, CRC Press, ISBN No-0-8493-9801-0

REFERENCE BOOKS

1. Handbook of Genetic Algorithms -Davis, Lawrence, ISBN:0-442-00173-8
2. An Introduction to Genetic Algorithms Melanie Mitchell, ISBN:81-203-1358-5

CE8.4.b.IP IMAGE PROCESSING (Elective IV)

Course Objectives:

The goal of this course is to provide an introduction to basic concepts and methodologies in digital image processing, and to develop a foundation that can be used as the basis for further study and research in image processing.

Instructional Objectives:

Upon successfully completing the course, the student should:

- Have a fundamental understanding of digital image processing techniques, including image enhancement, restoration, compression and segmentation.
- Be able to implement basic image processing algorithms
- Have the skill base necessary to further explore advanced topics of Digital Image Processing.

Lectures per week : (3 + 1 +2)
Max marks for theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for Orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Introduction (02 Hrs)

What Is Digital Image Processing?
Fundamental Steps in Digital Image Processing
Components of an Image Processing System

Digital Image Fundamentals (03 Hrs)

Elements of Visual Perception
Light and the Electromagnetic Spectrum
Image Sensing and Acquisition
Image Sampling and Quantization
Some Basic Relationships between Pixels

Image Enhancement in the spatial domain (06 Hrs)

Background
Some Basic Intensity Transformation Functions
Histogram Processing
Histogram Equalization
Histogram Matching (Specification)
Enhancement using arithmetic/logic operations
Basics of Spatial filtering
Smoothing Spatial Filters
Sharpening Spatial Filters

MODULE 2

Image Enhancements in the Frequency Domain (05 Hrs)
Introduction to the Fourier Transform and the Frequency Domain
Smoothing Frequency Domain Filters
- Ideal Lowpass Filters
- Butterworth Lowpass Filters
- Gaussian Lowpass Filters

Sharpening Frequency Domain Filters
- Ideal Highpass Filters
- Butterworth Highpass Filters
- Gaussian Highpass Filters

Implementation
- Properties of 2-D FT
- Convolution and Correlation theorems
- The Fast Fourier Transform (FFT)

Image Restoration (04 Hrs)
- A Model of the Image Degradation/Restoration Process
- Noise Models
- Restoration in the Presence of Noise
- Mean Filters
- Order-Statistics Filters
- Inverse Filtering
- Minimum Mean Square Error (Wiener) Filtering

MODULE 3

Color Image Processing (05 Hrs)
Color Fundamentals
Color Models
Basics of Full-Color Image Processing
Color Transformations
- Formulation
- Color Complements
- Color Slicing
- Tone and Color Corrections
- Histogram Processing

Smoothing and Sharpening
- Color Image Smoothing
- Color Image Sharpening

Image Segmentation Based on Color
- Segmentation in HSI Color Space
- Segmentation in RGB Vector Space

Image Compression (04 Hrs)
Fundamentals
Image Compression Model
Error-Free Compression
Variable-Length Coding
LZW Coding

Lossy Compression
Lossy Predictive Coding

Morphological Image Processing (03 Hrs**)**
Preliminaries
Erosion and Dilation
Opening and Closing
The Hit-or-Miss Transformation
Some Basic Morphological Algorithms

MODULE 4

Image Segmentation (05 Hrs)
Detection of Discontinuities
Edge Linking and Boundary Detection
Local Processing
Global Processing via the Hough Transform

Thresholding
Foundation
Basic Global Thresholding
Basic Adaptive Thresholding
Optimal Global and Adaptive Thresholding

Region-Based Segmentation

Representation and Description (04 Hrs)
Representation

Boundary Descriptors
Some Simple Descriptors
Shape Numbers
Fourier Descriptors
Statistical Moments

Regional Descriptors
Some Simple Descriptors
Topological Descriptors

TEXT BOOKS

1. Digital Image Processing by R.C. Gonzalez and R.E. Woods, Second Edition, Addison Wesley, ISBN: 81-7808-629-8.

REFERENCE BOOKS

1. Fundamentals of Digital Image Processing by A.K.Jain, PHI. ISBN:81-203-0929-4
2. Digital Image Processing by W.K.Pralt, McGraw Hill, ISBN: 9-814-12620-9

CE8.4.c.MC MOBILE COMPUTING (Elective IV)

Course objectives:

The course aims at providing the students with a deeper understanding of wireless basics, the protocols used for wireless system, wireless LAN technologies, telecommunication systems, some important layers of mobile protocol stack,

Instructional Objectives:

After completing the course the students will be able to know

- Details of wireless transmission
- MAC protocol
- GSM and DECT Telecommunication systems
- Mobile Network layer and Mobile Transport Layer
- Bluetooth
- WAP

Lectures per week : (3 + 1 +2)
Max marks for theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for Orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Introduction: (01 Hr)

Simplified Reference model

Wireless Transmission: (10 Hrs)

Frequencies for Radio Transmission
Signals
Antenna
Signal Propagation
Multiplexing
Modulation
Spread spectrum
Cellular systems

MODULE 2

Medium Access Control: (07 Hrs)

Motivation for a specialized MAC
SDMA
FDMA
TDMA
CDMA
Comparison of S/T/F/CDMA

Telecommunication System: (05 Hrs)

GSM
DECT

MODULE 3

Mobile Network Layer (05 Hrs)

Mobile IP
Dynamic Host Configuration Protocol
Mobile ad-hoc networks

Mobile Transport Layer (05 Hrs)

Traditional TCP
Classical TCP improvements
TCP over 2.5/3G wireless networks
Performance Enhancing Proxies

MODULE 4

Wireless LAN:

Bluetooth (05 Hrs)

Support for Mobility: (06 Hrs)

Wireless Application Protocol (version 1.x)

TEXT BOOKS:

1. Mobile Communications by Jochen Schiller, Pearson Education, Second Edition, 2003, ISBN:978-81-317-2426-2

CE8.4.d.MVL MACHINE VISION AND LEARNING (Elective IV)

Course Objectives: Objective of this course is to learn application of machine learning techniques in the field of Image processing.

Instructional Objectives: At the end of this course students will get hands-on experience on using machine vision techniques.

Lectures per week : (3 + 1 +2)
Max marks for theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for Orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5
(At least one question from each module with two compulsory questions from any one module.)

MODULE 1

Overview and Perspective of Image Interpretation (03 Hrs)

Introduction
Learning Image Interpretation
Image Interpretation Systems

Fuzzy Conditional Rule Generation for the Learning and Recognition of 3D objects from 2D images (08 Hrs)

Introduction
Literature Review
Input Data
Features and Their Attributes
The Fuzzy Conditional Rules Generation (FCRG) Classifier
Hypothesis Verification
Results

MODULE 2

Relational Evidence Theory and Interpreting Schematics (11 Hrs)

Introduction
Recognition by parts
Relational Learning
The Consolidated Relational Learning Algorithm (CLARET)
Relational Evidence and Hierarchical Modeling
Finite Interpretation
Schematic Interpretation
Performance Comparison

MODULE 3

Cite- Scene Understanding and Object Recognition (11 Hrs)

Recent Systems and Proposed Theory
Work Knowledge
Interpretation Structures
Operational Overview
Learning World Knowledge
Hypothesis generation
Relaxation Labeling with Hierarchical Constraint
Knowledge Driven Segmentation
Feature Extraction
System Performance and Results
System Operation

MODULE 4

See++: An Object Oriented theory of Task Specific Vision (10 Hrs)

Introduction
See++ Theory of Vision
System Architecture
Image Query Language
Knowledge Base
Machine Learning
See++ in action

TEXTBOOK

1. Machine Learning and Image Interpretation by Terry Caelli and Walter F. Bischof, Plenum Publishing Corporation, ISBN-0-306-45761-X