

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

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
Runtime storage management
Error handling

(02 Hrs)

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. Loudner, 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 Leblebici, 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. Gabricus, 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 to 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 (03 Hrs)

Overview of Java and Concept of JVM

Classes, objects and methods

Array, Strings, Vectors

Interfaces (02Hrs)

Packages

Exception and Error handling

Thread Programming (02 Hr)

File Handling

Applet Programming (03 Hrs)

Graphics Programming

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 Karhunen-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-Smith Addison 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 uncertainty of Scheduling the Future
- Scheduling Fundamentals
- PERT and CPM scheduling
- Leveling Resource Assignments
- Map the Schedule to a Real Calendar
- 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
Building 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