

# Syllabus for B.Tech(Computer Science & Engineering) Up to Fourth Year

Revised Syllabus of B.Tech CSE (for the students who were admitted in Academic Session 2010-2011)



**Proposed**

## Fourth Year - Seventh Semester

### A. THEORY

Sl. No.	Field	Theory	Contact Hours/Week				Cr. Pts	
			L	T	P	Total		
1	CS70	Software Engg.	3	0	0	3	3	
2		Compiler Design	3	0	0	3	3	
3	CS70	A. Pattern Recognition B. Soft Computing C. Artificial Intelligence D. Image Processing	3	0	0	3	3	
4	CS70	A. Distributed Operating System B. Cloud Computing C. Data Warehousing and Data Mining D. Sensor Networks E. Mobile Computing	3	0	0	3	3	
5	CS70	A. Internet Technology (IT) B. Microelectronics & VLSI Design (ECE) C. Control System (EE) D. Modelling & Simulation (M)	3	0	0	3	3	
<b>Total of Theory</b>						<b>15</b>	<b>15</b>	
<b>B. PRACTICAL</b>								
6	HU78	Group Discussion	0	0	3	3	2	
7	CS791	Software Engg. Lab	0	0	3	3	2	
8	CS793	A. Pattern Recognition B. Soft Computing C. Artificial Intelligence D. Image Processing	0	0	3	3	2	
9	CS795	A. Internet Technology (IT) B. Microelectronics & VLSI Design (ECE) C. Control System (EE) D. Modelling & Simulation (M)	0	0	3	3	2	
10	CS792	Industrial training	4 wks during 6 <sup>th</sup> -7 <sup>th</sup> Sem-break					2
11	CS794	Project- 1				3	2	
<b>Total of Practical</b>						<b>15</b>	<b>12</b>	
<b>Total of Semester</b>						<b>30</b>	<b>27</b>	

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## Proposed Syllabus VII Semester Theory

### Software Engineering

CS701

Contracts: 3L

Credits- 3

#### Module I

Software Engineering –Objectives, Definitions ,Soft ware Process models - Waterfall Model , Prototype model, RAD, Evolutionary Models ,Incremental, Spiral (4L)

Software Project Planning- Feasibility Analysis, Technical Feasibility, Cost- Benefit Analysis, COCOMO model. [4L]

#### Module II

Structured Analysis , Context diagram and DFD, Physical and Logical DFDs ,Data Modelling, ER diagrams, Software Requirements Specification (5L)

#### Module III

Design Aspects :Top-Down And Bottom-Up design; Decision tree, decision table and structured English, Structure chart, Transform analysis Functional vs. Object- Oriented approach. [3L]

#### Unified Modelling Language

Class diagram, interaction diagram: collaboration diagram, sequence diagram, state chart diagram, activity diagram, implementation diagram. (4L)

#### Module V

Coding & Documentation – Structured Programming, Modular Programming, Module Relationship- Coupling, Cohesion, OO Programming, Information Hiding, Reuse, System Documentation. [5L] Testing – Levels of Testing, Integration Testing, System Testing.(5L)

Software Quality, Quality Assurance, Software Maintenance, Software Configuration Management, Software Architecture. [6L]

#### Reference Books:

1. Software Engineering : A practitioner's approach– Pressman(TM)
2. Software Engineering- Pankaj Jalote (Wiley-India)
3. Software Engineering- Rajib Mall (PHI)
4. Software Engineering –Agarwal and Agarwal (PHI)

### Compiler Design

CS702

Contracts: 3L

Credits- 3

#### Module I

##### Introduction to Compiling [2L]

Compilers, Analysis-synthesis model , The phases of the compiler, Cousins of the compiler.

##### Lexical Analysis [5L]

The role of the lexical analyzer, Tokens, Patterns, Lexemes, Input buffering, Specifications of a token, Recognition of tokens, Finite automata, From a regular expression to an NFA, From a regular expression to NFA, From a regular expression to DFA, Design of a lexical analyzer generator (Lex).

#### Module II

##### Syntax Analysis [8L]

The role of a parser, Context free grammars, Writing a grammar, Top down Parsing, Non-recursive Predictive parsing (LL), Bottom up parsing, Handles, Viable prefixes, Operator precedence parsing, LR parsers (SLR, LALR), Parser generators (YACC). Error Recovery strategies for different parsing techniques.

##### Syntax directed translation [4L]

Syntax directed definitions, Construction of syntax trees, Bottom-up evaluation of S attributed definitions, L attributed definitions, Bottom-up evaluation of inherited attributes.

#### Module III

##### Type checking [3L]

Type systems, Specification of a simple type checker, Equivalence of type expressions, Type

conversions **Run time environments** [4L]

Source language issues (Activation trees, Control stack, scope of declaration, Binding of names), Storage organization (Subdivision of run-time memory, Activation records), Storage allocation strategies, Parameter passing (call by value, call by reference, copy restore, call by name), Symbol tables, dynamic storage allocation techniques.

#### Module IV

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## Intermediate code generation [3L]

Intermediate languages, Graphical representation, Three-address code, Implementation of three address statements (Quadruples, Triples, Indirect triples).

## Code optimization [4L]

Introduction, Basic blocks & flow graphs, Transformation of basic blocks, Dag representation of basic blocks, The principle sources of optimization, Loops in flow graph, Peephole optimization.

## Code generations [3L]

Issues in the design of code generator, a simple code generator, Register allocation & assignment.

## Text books:

1. Aho, Sethi, Ullman - "Compiler Principles, Techniques and Tools" - Pearson Education.
2. Holub - "Compiler Design in C" – PHI
3. Tremblay and Sorenson - Compiler Writing-McgrawHill International .
4. Chattopadhyay , S- Compiler Design ( PHI)

## Pattern Recognition

### CS703A

Contracts: 3L

Credits- 3

Module – I	
Introduction – Definitions, data sets for Pattern Recognition	2
Different Paradigms of Pattern Recognition	1
Representations of Patterns and Classes	2
Metric and non-metric proximity measures	2
Module - II	
Feature extraction	
Different approaches to Feature Selection	2
Nearest Neighbour Classifier and variants	1
Efficient algorithms for nearest neighbour classification	2
Module - III	
Different Approaches to Prototype Selection	2
Bayes Classifier	3
Decision Trees	3
Linear Discriminant Function	3
Module - IV	
Support Vector Machines	2
Clustering	3
Clustering Large datasets	2
Combination of Classifiers	2
Applications – Document Recognition	2

## REFERENCES

1. Devi V.S.; Murty, M.N. (2011) Pattern Recognition: An Introduction, Universities Press, Hyderabad.
2. R. O. Duda, P. E. Hart and D. G. Stork, Pattern Classification, Wiley, 2000.

## Soft Computing

### CS703B

Contracts: 3L

Credits- 3

## Module-I [2L]

*Introduction:* Introduction to soft computing; introduction to fuzzy sets and fuzzy logic systems; introduction to biological and artificial neural network; introduction to Genetic Algorithm.

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## Module-II [10L]

*Fuzzy sets and Fuzzy logic systems:*

**Classical Sets and Fuzzy Sets and Fuzzy relations :** Operations on Classical sets, properties of classical sets, Fuzzy set operations, properties of fuzzy sets, cardinality, operations, and properties of fuzzy relations.

**Membership functions :** Features of membership functions, standard forms and boundaries, different fuzzification methods.

**Fuzzy to Crisp conversions:** Lambda Cuts for fuzzy sets, Fuzzy Relations, Defuzzification methods.

**Classical Logic and Fuzzy Logic:** Classical predicate logic, Fuzzy Logic, Approximate reasoning and Fuzzy Implication

**Fuzzy Rule based Systems:** Linguistic Hedges, Fuzzy Rule based system – Aggregation of fuzzy Rules, Fuzzy Inference System- Mamdani Fuzzy Models – Sugeno Fuzzy Models.

**Applications of Fuzzy Logic:** How Fuzzy Logic is applied in Home Appliances, General Fuzzy Logic controllers, Basic Medical Diagnostic systems and Weather forecasting

## Module-III [10L]

*Neural Network*

**Introduction to Neural Networks:** Advent of Modern Neuroscience, Classical AI and Neural Networks, Biological Neurons and Artificial neural network; model of artificial neuron.

**Learning Methods :** Hebbian, competitive, Boltzman etc.,

**Neural Network models:** Perceptron, Adaline and Madaline networks; single layer network; Back-propagation and multi layer networks.

**Competitive learning networks:** Kohonen self organizing networks, Hebbian learning; Hopfield Networks.

**Neuro-Fuzzy modelling:**

**Applications of Neural Networks:** Pattern Recognition and classification

## Module-IV[10L]

**Genetic Algorithms:** Simple GA, crossover and mutation, Multi-objective Genetic Algorithm (MOGA). **Applications of Genetic Algorithm:** genetic algorithms in search and optimization, GA based clustering Algorithm, Image processing and pattern Recognition

## Module-V [4L]

Other Soft Computing techniques: Simulated Annealing, Tabu search, Ant colony optimization (ACO), Particle Swarm Optimization (PSO).

### Text Books:

1. Fuzzy logic with engineering applications, Timothy J. Ross, John Wiley and Sons.
2. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI
3. Principles of Soft Computing , S N Sivanandam, S. Sumathi, John Wiley & Sons
4. Genetic Algorithms in search, Optimization & Machine Learning by David E. Goldberg
5. Neuro-Fuzzy and Soft computing, Jang, Sun, Mizutani, PHI
6. Neural Networks: A Classroom Approach, 1/e by Kumar Satish, TMH,
7. Genetic Algorithms in search, Optimization & Machine Learning by David E. Goldberg, Pearson/PHI
8. A beginners approach to Soft Computing, Samir Roy & Udit Chakraborty, Pearson

### Reference Books:

1. Fuzzy Sets and Fuzzy Logic: Theory and Applications, George J. Klir and Bo Yuan, Prentice Hall
2. Neural Networks: A Comprehensive Foundation (2nd Edition), Simon Haykin, Prentice Hall.

### Artificial Intelligence

CS703C

Contracts: 3L

Credits- 3

39L

#### Introduction [2]

Overview of Artificial intelligence- Problems of AI, AI technique, Tic - Tac - Toe problem.

#### Intelligent Agents [2]

Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents.

#### Problem Solving [2]

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Problems, Problem Space & search: Defining the problem as state space search, production system, problem characteristics, issues in the design of search programs.

## **Search techniques [5]**

Solving problems by searching :problem solving agents, searching for solutions; uniform search strategies: breadth first search, depth first search, depth limited search, bidirectional search, comparing uniform search strategies.

## **Heuristic search strategies [4]**

Greedy best-first search, A\* search, memory bounded heuristic search: local search algorithms & optimization problems: Hill climbing search, simulated annealing search, local beam search, genetic algorithms; constraint satisfaction problems, local search for constraint satisfaction problems.

## **Adversarial search [3]**

Games, optimal decisions & strategies in games, the minimax search procedure, alpha-beta pruning, additional refinements, iterative deepening.

## **Knowledge & reasoning [3]**

Knowledge representation issues, representation & mapping, approaches to knowledge representation, issues in knowledge representation.

## **Using predicate logic [2]**

Representing simple fact in logic, representing instant & ISA relationship, computable functions & predicates, resolution, natural deduction.

## **Representing knowledge using rules [3]**

Procedural verses declarative knowledge, logic programming, forward verses backward reasoning, matching, control knowledge.

## **Probabilistic reasoning [3]**

Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafer theory, Fuzzy sets & fuzzy logics.

## **Planning [2]**

Overview, components of a planning system, Goal stack planning, Hierarchical planning, other planning techniques.

## **Natural Language processing [2]**

Introduction, Syntactic processing, semantic analysis, discourse & pragmatic processing.

## **Learning [3]**

Forms of learning, inductive learning, learning decision trees, explanation based learning, learning using relevance information, neural net learning & genetic learning.

## **Expert Systems [2]**

Representing and using domain knowledge, expert system shells, knowledge acquisition.

## **Basic knowledge of programming language like Prolog & Lisp. [3]**

### **Books:**

1. Artificial Intelligence, Ritch & Knight, TMH

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2. Artificial Intelligence A Modern Approach, Stuart Russel Peter Norvig Pearson
3. Introduction to Artificial Intelligence & Expert Systems, Patterson, PHI
4. Poole, Computational Intelligence, OUP
5. Logic & Prolog Programming, Saroj Kaushik, New Age International
6. Expert Systems, Giarranto, VIKAS
7. Artificial Intelligence, Russel, Pearson

## Image Processing

**CS703D**

**Contracts: 3L**

**Credits- 3**

**38L**

### Introduction [3L]

Background, Digital Image Representation, Fundamental steps in Image Processing, Elements of Digital Image Processing - Image Acquisition, Storage, Processing, Communication, Display.

### Digital Image Formation [4L]

A Simple Image Model, Geometric Model- Basic Transformation (Translation, Scaling, Rotation), Perspective Projection, Sampling & Quantization - Uniform & Non uniform.

### Mathematical Preliminaries [9L]

Neighbour of pixels, Connectivity, Relations, Equivalence & Transitive Closure; Distance Measures, Arithmetic/Logic Operations, Fourier Transformation, Properties of The Two Dimensional Fourier Transform, Discrete Fourier Transform, Discrete Cosine & Sine Transform.

### Image Enhancement [8L]

Spatial Domain Method, Frequency Domain Method, Contrast Enhancement -Linear & Nonlinear Stretching, Histogram Processing; Smoothing - Image Averaging, Mean Filter, Low-pass Filtering; Image Sharpening. High-pass Filtering, High-boost Filtering, Derivative Filtering, Homomorphic Filtering; Enhancement in the frequency domain - Low pass filtering, High pass filtering.

### Image Restoration [7L]

Degradation Model, Discrete Formulation, Algebraic Approach to Restoration - Unconstrained & Constrained; Constrained Least Square Restoration, Restoration by Homomorphic Filtering, Geometric Transformation - Spatial Transformation, Gray Level Interpolation.

### Image Segmentation [7L]

Point Detection, Line Detection, Edge detection, Combined detection, Edge Linking & Boundary Detection - Local Processing, Global Processing via The Hough Transform; Thresholding - Foundation, Simple Global Thresholding, Optimal Thresholding; Region Oriented Segmentation - Basic Formulation, Region Growing by Pixel Aggregation, Region Splitting & Merging.

Books:

1. Digital Image Processing, Gonzalves,Pearson
2. Digital Image Processing, Jahne, Springer India
3. Digital Image Processing & Analysis, Chanda & Majumder, PHI
4. Fundamentals of Digital Image Processing, Jain, PHI
5. Image Processing, Analysis & Machine Vision, Sonka, VIKAS
6. Getting Started with GIS- Clarke Keith. C; PE.
7. Concepts & Techniques of GIS - Lo C.P, Albert, Yeung K.W- PHI.

## Distributed Operating System

**CS704A**

**Contracts: 3L**

**Credits- 3**

**[36L]**

### Introduction to Distributed System [2]

Introduction, Examples of distributed system, Resource sharing, Challenges

### Operating System Structures: [3]

Review of structures: monolithic kernel, layered systems, virtual machines. Process based models and client server architecture; The

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micro-kernel based client-server approach.

## Communication [4]

Inter-process communication , Remote Procedure Call, Remote Object Invocation, Tasks and Threads. Examples from LINUX, Solaris 2 and Windows NT.

## Theoretical Foundations: [2]

Introduction. Inherent Limitations of distributed Systems. Lamport's Logical clock. Global State

## Distributed Mutual Exclusion:[4]

Classification of distributed mutual exclusion algorithm. NonToken based Algorithm:Lamport's algorithm, Ricart-Agrawala algorithm. Token based Algorithm: Suzuki-Kasami's broadcast algorithm.

## Distributed Deadlock Detection: [4]

Deadlock handling strategies in distributed systems. Control organizations for distributed deadlock detection. Centralized and Distributed deadlock detection algorithms: Completely Centralized algorithms, path pushing, edge chasing, global state detection algorithm.

## Protection and Security: [4]

Requirements for protection and security regimes. The access matrix model of protection. System and user modes, rings of protection, access lists, capabilities. User authentication, passwords and signatures. Use of single key and public key encryption.

## Distributed file systems: [6]

Issues in the design of distributed file systems: naming, transparency, update semantics and fault resilience. Use of the Virtual File System layer. Examples of distributed systems including Sun NFS, the Andrew filestore, CODA file system and OSF DCE.

## Distributed Shared Memory: [4]

Architecture and motivations. Algorithms for implementing DSM. Memory Coherence

## CORBA: [3]

The Common Object Request Broker Architecture model and software and its relationship to Operating Systems.

## Books:

1. Andrew S. Tanenbaum and Maarten Van Steen, Distributed Systems Principles and Paradigms, PHI
2. Singhal Mukesh & Shivaratri N. G., Advanced Concepts in Operating Systems, TMH
3. Tanenbaum, A. S. Distributed Operating Systems, (ISBN 0-131-439-340), Prentice Hall 199
4. Tanenbaum, A. S. Modern Operating Systems, 2<sup>nd</sup> Edition (ISBN 0-13-031358-0), Prentice Hall 2001.
5. Bacon, J., Concurrent Systems, 2nd Edition, (ISBN 0-201-177-676), Addison Wesley 1998.
6. Silberschatz, A., Galvin, P. and Gagne, G., Applied Operating Systems Concepts, 1st Edition, (ISBN 0-471-36508-4), Wiley 2000.
7. Coulouris, G. et al, Distributed Systems: Concepts and Design, 3rd Edition, (ISBN 0-201-61918-0), Addison Wesley 2001.
8. Galli, D.L., Distributed Operating Systems: Concepts and Practice (ISBN 0-13-079843-6), Prentice-Hall 2000.

## Cloud Computing

CS704B

Contracts: 3L

Credits- 3

### Module 1: Definition of Cloud Computing and its Basics (Lectures : 9)

#### 1. Definition of Cloud Computing:

Defining a Cloud, Cloud Types – NIST model, Cloud Cube model, Deployment models (Public , Private, Hybrid and Community Clouds), Service models – Infrastructure as a Service, Platform as a Service, Software as a Service with examples of services/ service providers, Cloud Reference model

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Characteristics of Cloud Computing – a shift in paradigm

Benefits and advantages of Cloud Computing

## 2. Cloud Architecture:

A brief introduction on Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications, Connecting to the Cloud by Clients

## 3. Services and Applications by Type

IaaS – Basic concept, Workload, partitioning of virtual private server instances, Pods, aggregations,

silos PaaS – Basic concept, tools and development environment with examples

SaaS - Basic concept and characteristics, Open SaaS and SOA, examples of SaaS platform

Identity as a Service (IDaaS)

Compliance as a Service (CaaS)

## Module 2 : Use of Platforms in Cloud Computing (Lectures : 12)

### 1. Concepts of Abstraction and Virtualization

Virtualization technologies : Types of virtualization (access, application, CPU, storage), Mobility patterns (P2V, V2V, V2P, P2P, D2C, C2C, C2D, D2D)

Load Balancing and Virtualization: Basic Concepts, Network resources for load balancing, Advanced load balancing (including Application Delivery Controller and Application Delivery Network), Mention of The Google Cloud as an example of use of load balancing

Hypervisors: Virtual machine technology and types, VMware vSphere Machine

Imaging (including mention of Open Virtualization Format – OVF)

Porting of applications in the Cloud: The simple Cloud API and AppZero Virtual Application appliance

### 2. Concepts of Platform as a Service

Definition of services, Distinction between SaaS and PaaS (knowledge of Salesforce.com and Force.com),

Application development

Use of PaaS Application frameworks

### 3. Use of Google Web Services

Discussion of Google Applications Portfolio – Indexed search, Dark Web, Aggregation and disintermediation,

Productivity applications and service, Adwords, Google Analytics, Google Translate, a brief discussion on Google Toolkit (including introduction of Google APIs in brief), major features of Google App Engine service.

### 4. Use of Amazon Web Services

Amazon Web Service components and services: Amazon Elastic Cloud, Amazon Simple Storage system, Amazon Elastic Block Store, Amazon SimpleDB and Relational Database Service

### 5. Use of Microsoft Cloud Services

Windows Azure platform: Microsoft's approach, architecture, and main elements, overview of Windows Azure

AppFabric, Content Delivery Network, SQL Azure, and Windows Live services

## Module 3 : Cloud Infrastructure (Lectures : 7)

Types of services required in implementation – Consulting, Configuration, Customization and Support

### 1. Cloud Management

An overview of the features of network management systems and a brief introduction of related products from large cloud vendors, Monitoring of an entire cloud computing deployment stack – an overview with mention of some products, Lifecycle management of cloud services (six stages of lifecycle)



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## 2. Concepts of Cloud Security

Cloud security concerns, Security boundary, Security service boundary Overview of security mapping

Security of data: Brokered cloud storage access, Storage location and tenancy, encryption, and auditing and compliance

Identity management (awareness of Identity protocol standards)

### **Module 4 : Concepts of Services and Applications (Lectures : 8)**

1. **Service Oriented Architecture:** Basic concepts of message-based transactions, Protocol stack for an SOA architecture, Event-driven SOA, Enterprise Service Bus, Service catalogs
2. **Applications in the Cloud:** Concepts of cloud transactions, functionality mapping, Application attributes, Cloud service attributes, System abstraction and Cloud Bursting, Applications and Cloud APIs
3. **Cloud-based Storage:** Cloud storage definition – Manned and Unmanned
4. **Webmail Services:** Cloud mail services including Google Gmail, Mail2Web, Windows Live Hotmail, Yahoo mail, concepts of Syndication services

#### **Books Recommended:**

1. Cloud Computing Bible by Barrie Sosinsky, Wiley India Pvt. Ltd, 2013
2. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, McGraw Hill Education (India) Private Limited, 2013
3. Cloud computing: A practical approach, Anthony T. Velte, Tata Mcgraw-Hill
4. Cloud Computing, Miller, Pearson
5. Building applications in cloud:Concept, Patterns and Projects, Moyer, Pearson
- 6.

#### **References:**

1. Cloud Computing – Second Edition by Dr. Kumar Saurabh , Wiley India

### **Data Warehousing & Data Mining**

CS704C

Contracts: 3L

Credits- 3

### **Module 1: Overview and Concepts of Data Warehousing (Lectures : 9)**

#### 4. Overview of Data warehousing

Strategic information and the need for Data warehousing, Defining a Data warehouse, Evolution of Data warehousing, Data warehousing and Business Intelligence

#### 5. The Building Blocks of Data warehouse

Defining features – Subject-oriented data, Integrated data, Time-variant data, Nonvolatile data, Data granularity Data warehouses and Data marts

Architectural Types – Centralized, Independent data marts, Federated, Hub-and-Spoke, Data mart bus

Overview of components - Source Data, Data Staging, Data Storage, Information Delivery, Metadata, and Management and Control components

#### 6. Business Requirements and Data warehouse

Dimensional nature of Business data and Dimensional Analysis, Dimension hierarchies and categories, Key Business Metrics (Facts), Requirement Gathering methods and Requirements Definition Document (contents)

Business Requirements and Data Design – Structure for Business Dimensions and Key Measurements, Levels of detail

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Business Requirements and the Architecture plan  
Business Requirements and Data Storage Specifications  
Business Requirements and Information Delivery Strategy

## **Module 2 : Data warehouse Architecture and Infrastructure (Lectures : 8)**

### **6. Architectural components**

Concepts of Data warehouse architecture – Definition and architecture in the areas of Data acquisition, Data storage, and Information delivery

Distinguishing characteristics – Different objectives and scope, Data content, Complex analysis for faster response, Flexible and Dynamic, Metadata-driven etc

Architectural Framework – supporting flow of data, and the Management and Control module Technical architecture – Data acquisition, Data storage, and Information delivery

Overview of the components of Architectural Types introduced in Module 1.

### **7. Infrastructure for Data warehousing**

Distinction between architecture and infrastructure, Understanding of how data warehouse infrastructure supports its architecture

Components of physical infrastructure, Hardware and Operating systems for data warehouse, Database Software, Collection of Tools,

Data warehouse Appliances – evolution and benefits

### **8. The role of Metadata**

Understanding the importance of Metadata

Metadata types by functional areas – Data acquisition, Data storage, and Information delivery Business Metadata – overview of content and examples

Technical Metadata – overview of content and examples

Metadata Requirements, Sources of Metadata, Metadata management – challenges, Metadata Repository, Metadata integration and standards

## **Module 3 : Data Design and Data Preparation (Lectures : 9)**

### **3. Principles of Dimensional Modeling**

Data Design – Design decisions, Basics of Dimensional modeling, E-R modeling versus Dimensional modeling The STAR schema – illustration, Dimension Table, Fact Table, Factless Fact Table, Data granularity

STAR schema keys – Primary, Surrogate, and Foreign

Advantages of the STAR schema, STAR schema examples

### **4. Data Extraction, Transformation, and Loading**

Overview of ETL, Requirements of ETL and steps Data extraction – identification of sources and techniques

Data transformation – Basic tasks, Transformation types, Data integration and consolidation, Transformation for dimension attributes

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Data loading – Techniques and processes, Data refresh versus update, Procedures for Dimension tables, Fact tables :  
History and incremental loads  
ETL Tool options

## 5. Data Quality

Importance of data quality, Challenges for data quality, Data quality tools, Data cleansing and purification, Master Data Management

### Module 4 : Information access and delivery (Lectures : 10)

## 5. Matching information to classes of users

Information from Data warehouse versus Operational systems, Users of information – their needs and how to provide information

Information delivery – queries, reports, analysis, and applications

Information delivery tools – Desktop environment, Methodology and criteria for tool selection, Information delivery framework, Business Activity Monitoring, Dashboards and Scorecards

## 6. OLAP in Data warehouse

Overall concept of Online Analytical Processing (OLAP), OLAP definitions and rules, OLAP characteristics

Major features and functions of OLAP – General features, Dimensional analysis, Hypercubes, Drill Down and Roll Up, Slice and Dice, Rotation, Uses and Benefits

Familiarity with OLAP models – Overview of variations, MOLAP, ROLAP, HOLAP, DOLAP, Database OLAP, Web OLAP

## 7. Data Warehouse and the web

Web-enabled Data Warehouse – adapting data warehouse for the web

Web-based information delivery – Browser technology for data warehouse and Security

issues OLAP and Web – Enterprise OLAP, Web-OLAP approaches, OLAP Engine design

## 8. Data Mining

Overview of Data mining – Definition, Knowledge Discovery Process (Relationships, Patterns, Phases of the process), OLAP versus Data mining

Some aspects of Data mining – Association rules, Outlier analysis, Predictive analytics etc) Concepts of Data mining in a Data warehouse environment

Major Data Mining techniques – Cluster Detection, Decision Trees, Memory-based Reasoning, Link Analysis, Neural Networks, Genetic Algorithms etc

Data Mining Applications in industry – Benefits of Data mining, Discussion on applications in Customer Relationship Management (CRM), Retail, Telecommunication, Biotechnology, Banking and Finance etc

**Books Recommended:**

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7. Data Warehousing Fundamentals for IT Professionals, Second Edition by Paulraj Ponniah, Wiley India

## References:

2. Data Warehousing, Data Mining, & OLAP – Second Edition by Alex Berson and Stephen J. Smith, Tata McGraw Hill Education
3. Data warehouse Toolkit by Ralph Kimball, Wiley India

## Sensor Networks

CS704D

Contracts: 3L

Credits- 3

### Module I: Introduction and Overview [4L]

**Learning Objective: To provide an overview about sensor networks and emerging technologies.**

Overview of wireless networks, types, infrastructure-based and infrastructure-less, introduction to MANETs (Mobile Ad-hoc Networks), characteristics, reactive and proactive routing protocols with examples, introduction to sensor networks, commonalities and differences with MANETs, constraints and challenges, advantages, applications, enabling technologies for WSNs.

### Module II: Architectures [9L]

**Learning Objective: To study about the node and network architecture of sensor nodes and its execution environment.**

Single-node architecture - hardware components, design constraints, energy consumption of sensor nodes, operating systems and execution environments, examples of sensor nodes, sensor network scenarios, types of sources and sinks – single hop vs. multi hop networks, multiple sources and sinks – mobility, optimization goals and figures of merit, gateway concepts, design principles for WSNs, service interfaces for WSNs.

### Module III: Communication Protocols [9L]

**Learning Objective: To understand the concepts of communication, MAC, routing protocols and also study about the naming and addressing in WSN.**

Physical layer and transceiver design considerations, MAC protocols for wireless sensor networks, low duty cycle protocols and wakeup concepts - S-MAC, the mediation device protocol, wakeup radio concepts, address and name management, assignment of MAC addresses, routing protocols- classification, gossiping, flooding, energy-efficient routing, unicast protocols, multi-path routing, data-centric routing, data aggregation, SPIN, LEACH, Directed-Diffusion, geographic routing.

### Module IV: Infrastructure Establishment [9L]

**Learning Objective: To learn about topology control and clustering in networks with timing synchronization for localization services with sensor tasking and control.**

Topology control, flat network topologies, hierarchical networks by clustering, time synchronization, properties, protocols based on sender-receiver and receiver-receiver synchronization, LTS, TPSN, RBS, HRTS, localization and positioning, properties and approaches, single-hop localization, positioning in multi-hop environment, range based localization algorithms – location services, sensor tasking and control.

### Module V: Sensor Network Platforms and Tools [9L]

**Learning Objective: To study about sensor node hardware and software platforms and understand the simulation and programming techniques.**

Sensor node hardware, Berkeley motes, programming challenges, node-level software platforms, node-level simulators, state-centric programming, Tiny OS, nesC components, NS2 simulator, TOSSIM.

## TEXT BOOKS

1. Holger Karl & Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

## REFERENCES

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, and Applications", John Wiley, 2007.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.
3. Thomas Haenselmann, "Sensor Networks", available online for free, 2008.
4. Edgar Callaway, "Wireless Sensor Networks: Architectures and Protocols", Auerbach, 2003.

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## Mobile Computing

**CS704E**

**Contracts: 3L**

**Credits- 3**

Introduction to Personal Communications Services (PCS): PCS Architecture, Mobility management, Networks signalling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling. [5L]

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

[5L]

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML). Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies. [7L]

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.

[7L]

Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems. Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.

[7L]

Server-side programming in Java, Pervasive web application architecture, Device independent example application

[8L]

### Text :

1. "Pervasive Computing", Burkhardt, Pearson
2. "Mobile Communication", J. Schiller, Pearson
3. "Wireless and Mobile Networks Architectures", Yi-Bin g Lin & Imrich Chlamtac, John Wiley & Sons, 2001
4. "Mobile and Personal Communication systems and services", Raj Pandya, Prentice Hall of India, 2001.

### Reference :

1. "Guide to Designing and Implementing wireless LANs" , Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
2. "Wireless Web Development", Ray Rischpater, Springer Publishing,
3. "The Wireless Application Protocol", Sandeep Singha l, Pearson .
4. "Third Generation Mobile Telecommunication systems" , by P.Stavronlakis, Springer Publishers,

## Internet Technology

**CS705A**

**Contracts: 3L**

**Credits- 3**

**34L**

### Module I-6L

Introduction (1L):

Overview, Network of Networks, Intranet, Extranet and Internet.

World Wide Web (1L):

Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP.

Review of TCP/IP (1L):

Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6.

IP Subnetting and addressing (1L):

Classful and Classless Addressing, Subnetting. NAT, IP masquerading, IP tables.

Internet Routing Protocol (1L):

Routing -Intra and Inter Domain Routing, Unicast and Multicast Routing, Broadcast.

Electronic Mail (1L):

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POP3, SMTP.

## Module II-9L

HTML (3L):

Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Colorname, Colorvalue.

Image Maps (1L):

map, area, attributes of image area.

Extensible Markup Language (XML) (4L):

Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief.

CGI Scripts (1L):

Introduction, Environment Variable, GET and POST Methods.

## Module III-10L

PERL (3L):

Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling.

JavaScript (4L):

Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation.

Cookies (1L):

Definition of cookies, Create and Store a cookie with example.

Java Applets (2L):

Container Class, Components, Applet Life Cycle, Update method; Parameter passing applet, Applications.

## Module IV-4L

Client-Server programming In Java (2L):

Java Socket, Java RMI.

Threats (1L):

Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks.

Network security techniques (2L):

Password and Authentication; VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH).

Firewall (1L):

Introduction, Packet filtering, Stateful, Application layer, Proxy.

## Module v-5L

Internet Telephony (1L):

Introduction, VoIP.

Multimedia Applications (2L):

Multimedia over IP: RSVP, RTP, RTCP and RTSP. Streaming media, Codec and Plugins, IPTV.

Search Engine and Web Crawler (2L):

Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

Reference:

1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013. (Chapters 1-5,7,8,9).
2. Internetworking Technologies, An Engineering Perspective, Rahul Banerjee, PHI Learning, Delhi, 2011. (Chapters 5,6,12)

## Microelectronics & VLSI Design

CS705B

Contracts: 3L

Credits- 3

36L

Module	Content	Hour
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1	<b>Introduction to VLSI Design:</b> VLSI Design Concepts, Moor's Law, Scale of Integration (SSI, MSI, LSI, VLSI, ULSI – basic idea only), Types of V LSI Chips (Analog & Digital VLSI chips, General purpose, ASIC, PLA, FPGA), Design principles (Digital VLSI – Concept of Regularity, Granularity etc), Design Domains (Behavioral, Structural, Physical), Y-Chart, Digital VLSI Design Steps.	6
2	<b>MOS structure:</b> E-MOS & D-MOS, Charge inversion in E-MOS, Threshold voltage, Flat-band voltage, Potential balance & Charge balance, Inversion, MOS capacitances. <b>Three Terminal MOS Structure:</b> Body effect. <b>Four Terminal MOS Transistor:</b> Drain current, I-V characteristics. Current-voltage equations (simple derivation). <b>Scaling in MOSFET:</b> Short Channel Effects, General scaling, Constant Voltage & Field scaling.] <b>CMOS:</b> CMOS inverter, Simple Combinational Gates - NAND gate and NOR Gate using CMOS.	10
3	<b>Micro-electronic Processes for VLSI Fabrication:</b> Silicon Semiconductor Technology- An Overview, Wafer processing, Oxidation, Epitaxial deposition, Ion-implantation & Diffusion, Cleaning, Etching, Photo-lithography – Positive & Negative photo-resist <b>Basic CMOS Technology</b> – (Steps in fabricating CMOS), Basic n-well CMOS process, p-well CMOS process, Twin tub process, Silicon on insulator <b>Layout Design Rule:</b> Stick diagram with examples, Layout rules.	10
4	<b>Hardware Description Language</b> – VHDL or Verilog Combinational & Sequential Logic circuit Design.	10

**Text Books:**

1. Digital Integrated Circuit, J.M.Rabaey, Chandrasan, Nolic, Pearson Education.
2. CMOS Digital Integrated Circuit, S.M.Kang & Y.Leblicic, TMH.
3. Modern VLSI Design, Wayne Wolf, Pearson Education.
4. VHDL, Bhaskar, PHI.
5. Advance Digital Design Using Verilog , Michel D. Celliti, PHI

**References:**

1. Digital Integrated Circuits, Demassa & Ciccone, John Willey & Sons .
2. Modern VLSI Design: system on silicon, Wayne Wolf; Addison Wesley Longman Publisher
3. Basic VLSI Design, Douglas A. Pucknell & Kamran Eshranghian, PHI
4. CMOS Circuit Design, Layout & Simulation, R.J.Baker, H.W.Lee, D.E. Boyee, PHI

**Control System**

**CS705C**

**Contracts: 3L**

**Credits- 3**

**36L**

**Module – I:**

**a) INTRODUCTION**

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impul se Response and transfer functions - Translational and Rotational mechanical systems [4L]

**Module – I:**

**b) TRANSFER FUNCTION REPRESENTATION**

Transfer Function of linear systems, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow grap h - Reduction using mason's gain formula.

[4L]

**Module – II:**

**a) TIME RESPONSE ANALYSIS**

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback cont rol systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state e rrors and error constants.

[4L]

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## b) STABILITY ANALYSIS IN S-DOMAIN

The concept of stability – Routh’s stability criterion – limitations of Routh’s stability.

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to  $G(s)H(s)$  on the root loci. [5L]

### Module – III:

#### a) FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications–Bode diagrams–Determination of Frequency domain specifications and transfer function from the Bode Diagram–Phase margin and Gain margin–Stability Analysis from Bode Plots. [5L]

#### b) : STABILITY ANALYSIS IN FREQUENCY DOMAIN

Polar Plots, Nyquist Plots Stability Analysis. [4L]

### Module - IV :

#### a) CLASSICAL CONTROL DESIGN TECHNIQUES

Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers. [5L]

#### b) STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and its Properties – Concepts of Controllability and Observability [5L]

### TEXT BOOKS:

- Automatic Control Systems 8th edition– by B. C. Kuo 2003– John Wiley and son’s.,
- Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

### REFERENCE BOOKS:

- Modern Control Engineering – by Katsuhiko Ogata –Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
- Control Systems Engg. by NISE 3rd Edition – John Wiley

## Modelling & Simulation

### CS705D

Contracts: 3L

Credits- 3

### Module-I: Introduction to Modelling and Simulation :

Nature of Simulation. Systems , Models and Simulation, Continuous and Discrete Systems, system modelling, Components of a simulation study, Introduction to Static and Dynamic System simulation , Application areas, Advantages ,Disadvantages and pitfalls of Simulation. **6L**

### Module –II : System Dynamics & Probability concepts in Simulation :

Exponential growth and decay models, Generalization of growth models , Discrete and Continuous probability functions, Continuous Uniformly Distributed Random Numbers, Generation of a Random numbers, Generating Discrete distributions, Non-Uniform Continuously Distributed Random Numbers, Rejection Method. **10L**

### Module-III : Simulation of Queuing Systems and Discrete System Simulation :

Poisson arrival patterns, Exponential distribution, Service times, Normal Distribution Queuing Disciplines, Simulation of single and two server queue. Application of queuing theory in computer system. Discrete Events ,Generation of arrival patterns ,Simulation programming tasks , Gathering statistics, Measuring occupancy and Utilization , Recording Distributions and Transit times . **14L**

### Module-IV : Analysis of Simulation output :

Sensitivity Analysis, Validation of Model Results **6L**

### Text Books:

- Jerry Banks, John Carson, B.L.Nelson and D.M.Nicol “ Discrete Event System Simulation”, Fifth Edition, Pearson.
- Narsingh Deo, 1979, System Simulation with Digital Computers, PHI.
- Geoffrey Gordon, “System Simulation”, PHI.
- Averill M. Law and W.David Kelton, “Simulation Modeling and Analysis”, Third Edition, McGraw Hill
- J. N. Kapoor.. Mathematical Modelling, Wiley eastern Limited.



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## Reference Books:

1. Sankar Sengupta, "System Simulation and Modeling", Pearson.
2. C.Dennis Pegden, Robert E.Shannon and Randall P.Sadowski, 1995, Introduction to Simulation using SIMAN, 2nd Edn., Tata McGraw-Hill.
3. A.M.Law and W.D.Kelton.. Simulation Modelling and Analysis, T.M.H. Edition.

## Practical

### Group Discussion

**HU781**

**Contracts: 3L**

**Credits- 2**

### To be prepared

#### Software Engineering Lab

**CS791**

**Contracts: 3L**

**Credits- 2**

Assignments to be given from the following

- 1.Preparation of requirement document for standard application problems in standard format.(e.g Library Management System, Railway Reservation system, Hospital management System, University Admission system)
- 2.Project Schedule preparation .
3. Use Case diagram,Class diagram,Sequence diagram and prepare Software Design Document using tools like Rational Rose.( For standard application problems)
- 4.Estimation of project size using Function Point(FP) for calculation.
- 5.Design Test Script/Test Plan(both Black box and White Box approach)
- 6.Compute Process and Product Metrics (e.g Defect Density,Defect Age,Productivity,Cost etc.)>Also by Cost Estimation models.

#### Pattern Recognition Lab

**CS793A**

**Contracts: 3L**

**Credits- 2**

Efficient algorithms for nearest neighbour classification,  
Example problem on Bayes classifier,  
Decision tree construction.  
Implementation of Linear Discriminant Function,  
Implementation of Support Vector Machine.

#### Soft Computing Lab

**CS793B**

**Contracts: 3L**

**Credits- 2**

In this laboratory the students need to implement the soft computing tools in Matlab. Some exposure in C also can be used for neural network and Genetic Algorithm.

**A sample assignment list is given below:**

#### FUZZY LOGIC:

1. Write a Matlab program to implement the different Fuzzy Membership functions.
2. Write a Matlab program to implement Fuzzy set operations and its properties.
3. Write a Matlab code to implement composition of Fuzzy and Crisp Relations.

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4. Write Matlab code to implement Fuzzy Information System (develop the system using command line and GUI based Fuzzy toolbox)

## Neural network:

5. Write Matlab code to implement McCulloch-Pitts neural network for generate AND, OR functions.
6. Write Matlab code to implement Perceptron learning for particular set of problem.
7. Write Matlab code for OR function with bipolar inputs and targets using Adaline network.
8. Write Matlab code for XOR function with bipolar inputs and targets using Madaline network.
9. Write C program to implement McCulloch-Pitts model to generate AND, OR functions.

## Genetic Algorithm

10. Write a Matlab code for maximizing  $F(x)=x^2$ , where x ranges from say 0 to 31 using Genetic Algorithm.
11. Use of Genetic Algorithm toolbox in matlab for optimization problem solving.
12. Implantation Simple Genetic Algorithm in C for solving optimization problem.

## Artificial Intelligence Lab

**CS793C**

**Contracts: 3L**

**Credits- 2**

Assignments to be framed

Programming Languages such as PROLOG & LISP

## Image Processing Lab

**CS793D**

**Contracts: 3L**

**Credits- 2**

1. Display of Grayscale Images.
2. Histogram Equalization.
3. Non-linear Filtering.
4. Edge detection using Operators.
5. 2-D DFT and DCT.
6. Filtering in frequency domain.
7. Display of color images.
8. Conversion between color spaces.
9. DWT of images.
10. Segmentation using watershed transform.

## Internet Technology Lab

**CS795A**

**Contracts: 3L**

**Credits- 2**

Applet

1. Create a banner using Applet
2. Display clock using Applet
3. Create different shapes using Applet
4. Fill colors in shapes using Applet
5. Goto a link using Applet
6. Create an event listener in Applet
7. Display image using Applet
8. Open a link in a new window using Applet
9. Play sound using Applet
10. Read a file using Applet
11. Write to a file using Applet

JavaScript

12. Validate the fields of a form using JavaScript.
13. Guess a number based on user input.
14. Program on image rollover using JavaScript.

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15. Display clock using JavaScript.
16. Prompt, alert, array, looping in JavaScript.
17. Calculator using JavaScript.
18. Validate e-mail, phone no. using reg-ex in JavaScript.

Perl

19. Write a perl script to implement associative array.
20. Write a perl script to implement the regular expression as follows: a).

If a string contains any vowel, count the total number of vowels.

- b). If a string starts with MCA and end with bw, print 1 else 0.
- c). If string starts with 0 or any no. a's, then print 1 else 0.

21. Write an html code to call a perl script from cgi-bin.

22. Implement the following with regular expression in Perl:

- a). a\*bc
- b). a\* at least 2 b's
- c). a\*exactly 3 b's

23. A simple File operation using

Perl. Client Server Programming

24. Write a socket program to get the current date and time from the server.
25. Write a socket program where the client will send lowercase letters and the server will return uppercase letter.
26. Write a server and a client program to implement TCP chat server-client.
27. Create a simple calculator application using Java RMI.

HTML

1. Start your web page with an <html> tag
  - i) Add a heading.
  - ii) Add a title.
  - iii) Start the <body> section.
  - iv) Add the following text using <H1> and </H1> tags: This Web page was designed by (your name)
  - v) Add the following text using <H2> and </H2> tags: My HTML assignment
  - vi) Add a horizontal line
  - vii) Insert an image to your web page.

Note: You should then refer to your image with just the filename, and NOT the entire pathname to the file.

- viii) Add another horizontal line.
- ix) Enter a paragraph of text.

Write about things you have learned in html.

Make sure the text in this paragraph is a color other than black, but something one can see.

Add a link that takes you to your favorite webpage.

- x) Start a new paragraph. Add a three item ordered list. Make it creative (don't just say item 1, item 2, etc... and keep it clean)!
- xi) Close out your body and html tags.

2. Start your web page with an <html> tag
  - i) Add a heading.
  - ii) Add a title.
  - iii) Start the <body> section.
  - iv) Start a new paragraph.

Use alignment attribute,

Use bold, italic, underline tags,

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Use font tag and associated attributes,

Use heading tags,

Use preserve tag,

Use non breaking spaces (escape character).

3. Start your web page with an <html> tag

i) Add a heading.

ii) Add a title.

iii) Start the <body> section.

iv) Start a new

paragraph. Create Hyperlinks:

(a) Within the HTML document.

(b) To another URL.

(c) To a file that can be rendered in the browser.

4. Start your web page with an <html> tag

i) Add a heading.

ii) Add a title.

iii) Start the <body>

section. Create an unordered list,

Create an ordered list,

Use various bullet styles,

Create nested lists,

Use the font tag in conjunction with

lists, Create definition lists,

Use graphics as bullets.

5. Start your web page with an <html> tag

i) Add a heading.

ii) Add a title.

iii) Start the <body> section.

a) Create a simple table

Create borders and adjust border size.

Adjust table cell spacing.

Change border color.

Change table background color.

b) Align a new table on HTML

page. Perform cell text alignment,

Create multi-column tables,

Display information about your academic qualification into this table.

6. Start your web page with an <html> tag

i) Add a heading.

ii) Add a title.

iii) Start the <body>

section. Create a frameset:

Use frame tags,

Create vertical (column) frames,

Create horizontal (row) frames,

Create complex framesets,

Use the hyperlink tag to target displaying an HTML page to another frame.

7. Start your web page with an <html> tag

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- i) Add a heading.
- ii) Add a title.
- iii) Start the <body> section.

Create a simple HTML form.

Use the input tag to create a: text box; text area box; check box; list box; radio button; password field; popup menu; hidden field. Use submit and reset buttons. Create an admission form using the above information.

8. Create a web page that will include an image. Then create image map to watch different parts of that image closely.

9. Using frames as an interface, create a series of web pages where the theme is to provide resources (internet, intranet, static HTML pages) pertaining to the subject of HTML. Ideally, your goal is to create a resource that you can use long after this module when needing information on HTML. As a minimum requirement to this assignment your webpage should:

- Consist of at least 3 frames.
- Contain at least 5 URLs to internet and/or intranet sites that you can reference as part of your job.
- Contain at least 5 references to documents that you have created that you use on a regular basis.
- Contain at least 5 references to documents others have created that you use on a regular basis.
- Be organized in a fashion that is logical and intuitive to you.
- Is done with enough quality that you would not be opposed to it being a link at another site.

10. Create a web page as you wish and the html elements of the page will be styled by CSS.

## XML

1. Write a XML program that will create an XML document which contains your mailing address.
2. Write a XML program that will create an XML document which contains description of three book category.
3. Create an XML document that contains the name and price per pound of coffee beans.
  - i) In your XML document mention all properties of XML declaration.
  - ii) The root element has name <coffee\_bean>
  - iii) Create nested elements for different types of coffee.
  - iv) Validate the document and if any parsing error is present, fix them.
4. Create an XML document that contains airline flight information.
  - i) In your XML document mention all properties of XML declaration.
  - ii) The root element has name <airlines>
  - iii) Create three nested <carrier> elements for three separate airlines. Each element should include a name attribute.
  - iv) Within each <carrier> nest at least two <flight>, each of which contains departure\_city, destination\_city, fl\_no, dept\_time.
  - v) Validate the document and if any parsing error is present fix them.
5. Create an XML version of your resume. Include elements such as your name and position desired. Nest each of your former employers within an <employer> element. Also, nest your educational experience within an <education> element. Create any other nested elements that you deem appropriate, such as <references> or <spcl\_skills> elements.
6. Create a DTD on product catalog.

## Microelectronics & VLSI Lab

CS795B

Contracts: 3L

Credits- 2

To be Implemented..

## Control System Lab

CS795C

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Contracts: 3L

Credits- 2

Sl.No.	Name of the Experiment	Periods
•	Familiarization with MATLAB Control System tool Box, MATLAB- SIMULINK tool box & pSPICE.	3
•	Determination of step response for 1 <sup>st</sup> order & 2 <sup>nd</sup> order system with unity feedback on CRO & calculation of control system specifications for variations of system design.	3
•	Simulation of step response & impulse response for Type-I & Type-II system with unity feedback using MATLAB & pSPICE.	3
•	Determination of root locus, Bode-plot, Nyquist Plot, using MATLAB control system toolbox for a given 2 <sup>nd</sup> order transfer function & determination of different control system specifications.	6
•	Determination of PI, PD, and PID controller action on 1 <sup>st</sup> order simulated process.	3
•	Determination of approximate transfer function experimentally using Bode Plot.	3
•	Evaluation of steady-state error, setting time, percentage peak overshoots, gain margin, phase margin with addition of lead compensator in forward path transfer functions using MATLAB & pSPICE.	3
•	Study of position control system using servomotor.	3
•	Design and hardware implementation of a temperature controller using microprocessor/microcontroller.	6

### Modelling & Simulation Lab

CS795D

Contracts: 3L

Credits- 2

In this laboratory the students will develop different simulation models. Students also may use any standard software to develop the models. (Using MATLAB/SCILAB/Any other simulation package)

A sample assignment list is given below:

1. Simulate CPU scheduling algorithm using queuing system a) FCFS b) SJF c) Priority Algo
2. Simulate congestion control algorithms.
3. Simulate disk scheduling algorithms.
4. Simulate Telephone system model

Simulate traffic system in computer networks