

**UNIVERSITY OF PUNE**  
**TE (COMPUTER ENGINEERING)- 2008 COURSE**

**Term-I**

Sub Code	Subject	Teaching Scheme		Examination Scheme				Total Marks
		Lect	Pract	Th	TW	Pr	Or	
310241	Database Management Systems	03	—	100	—	—	—	100
310242	Data Communications	03	—	100	—	—	—	100
310243	Microprocessors and Micro-controllers	03	—	100	—	—	—	100
310244	Digital Signal Processing	04	—	100	—	—	—	100
310245	Theory of Computation	03	—	100	—	—	—	100
310246	RDBMS and Visual Programming Laboratory	02	04	—	50	50	—	100
310247	Signal Processing Laboratory	—	04	—	25	—	50	075
310248	Hardware Laboratory	—	04	—	25	50	—	075
<b>Total</b>		<b>18</b>	<b>12</b>	<b>500</b>	<b>100</b>	<b>100</b>	<b>50</b>	<b>750</b>
<b>Total of Part I (A)</b>		<b>30 Hrs</b>		<b>750</b>				

**Term-II**

Sub Code	Subject	Teaching Scheme		Examination Scheme				Total Marks
		Lect	Pract	Th	TW	Pr	Or	
310249	Principles of Programming Languages	03	—	100	—	—	—	100
310250	Computer Networks	03	—	100	—	—	—	100
<b>310251</b>	<b>Finance and Management Information Systems</b>	<b>04</b>	—	<b>100</b>	—	—	—	<b>100</b>
<b>310252</b>	<b>Systems Programming &amp; Operating Systems</b>	<b>04</b>	—	<b>100</b>	—	—	—	<b>100</b>
310253	Software Engineering	03	—	100	—	—	—	100
310254	Software Laboratory	—	04	—	25	50	—	075
310255	Computer Networks	01	04	—	25	—	50	075
310256	Software Development Tools Laboratory	—	02	—	50	—	—	050
310257	Seminar and Technical Communication	—	02	—	50	—	—	050
<b>Total</b>		<b>18</b>	<b>12</b>	<b>500</b>	<b>150</b>	<b>50</b>	<b>50</b>	<b>750</b>
<b>Total of Part II (B)</b>		<b>30 Hrs</b>		<b>750</b>				
<b>Grand Total</b>				<b>1500</b>				

Th: Theory

Tw: Term Work

Pr: Practical

Or: Oral

# 310241: DATABASE MANAGEMENT SYSTEMS

**Teaching scheme:**  
**Lectures: 3 Hrs/Week**

**Examination Scheme:**  
**Theory: 100 Marks**

## **Objectives:**

- To implement an entity relationship diagrams (ERD) to express requirements and demonstrates skills to model data requirements and create data models in to normalized designs
- To develop understanding of database systems theory in order to apply that knowledge to any particular database implementation using SQL
- To learn and understand various Database Architectures and Applications

## **Prerequisites:**

- Discrete Structures
- Data Structures

## **Unit I : Introduction to DBMS (06 Hrs)**

**Introduction :** Basic concepts, Advantages of a DBMS over file-processing systems, Data abstraction, Database Languages, Data Models: Introduction to Hierarchical, Network, ER, and Object Relational Model, Data Independence, Components of a DBMS and overall structure of a DBMS, Multi-User DBMS Architecture, System Catalogs

**Data Modeling:** Basic Concepts, entity, attributes, relationships, constraints, keys, E-R and EER diagrams: Components of E-R Model, conventions, converting E-R diagram into tables, EER Model components, converting EER diagram into tables

**Relational Model:** Basic concepts, Attributes and Domains, Codd's Rules, Relational Integrity: Domain, Entity, Referential Integrities, Enterprise Constraints, Views, Schema Diagram

## **Unit II : Relational Algebra & SQL (08 Hrs)**

**Relational Query Languages:** Relational Algebra

**Introduction to SQL:** Characteristics and advantages, SQL Data Types and Literals, DDL, DML, SQL Operators, Tables: Creating, Modifying, Deleting, Views: Creating, Dropping, Updating using Views, Indexes, Nulls

**SQL DML Queries:** SELECT Query and clauses, Set Operations, Predicates and Joins, Set membership, Tuple Variables, Set comparison, Ordering of Tuples, Aggregate Functions, Nested Queries, Database Modification using SQL Insert, Update and Delete Queries, concept of Stored Procedures, Cursors, Triggers, assertions, roles and privileges Programmatic SQL: Embedded SQL, Dynamic SQL.

## **Unit III : Relational Database Design (06 Hrs)**

Purpose of Normalization, Data Redundancy and Update Anomalies, Functional Dependencies: Basic concepts, closure of set of functional dependencies, closure of attribute set, canonical cover, Decomposition: lossless join decomposition and dependency preservation, The Process of Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF.

## **Unit IV : File Systems & Query Processing (06 Hrs)**

File Organization, Organization of records in files, Indices, Static and Dynamic Hashing, B-trees and B+ Trees

**Introduction to Query Processing:** Overview, Measures of query cost, Selection and join operations, Evaluation of Expressions, Introduction to Query Optimization, Estimation, Transformation of Relational Expressions

**Unit V : Transaction Management****(06 Hrs)**

Basic concept of a Transaction, Properties of Transactions, Concept of Schedule, Serial Schedule, Serializability: Conflict and View, Cascaded Aborts, Recoverable and Non-recoverable Schedules, Concurrency Control: Need, Locking Methods, Deadlocks, Timestamping Methods, Optimistic Techniques, Multi-Version Concurrency Control, Different Crash Recovery methods such as Shadow-Paging and Log-Based Recovery: Deferred and Immediate, Checkpoints

**Unit VI : Object-Oriented Databases and Database Architectures****(06 Hrs)**

Need of OODBMS, Storing Objects in Relational Database, Introduction to OO Data Models, Persistent Programming Languages, Pointer Swizzling Techniques

**Database Architectures:** Centralized and Client-Server Architectures, 2 Tier and 3 Tier Architecture, Introduction to Distributed Database systems. Introduction to data mining using association rules, introduction to data warehousing and its components.

**Text Books:**

1. Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", 5<sup>th</sup> Edition, McGraw Hill Publishers, 2002, ISBN 0-07-120413-X
2. Elmasri R., Navathe S., "Fundamentals of Database Systems", 4<sup>th</sup> Edition, Pearson Education, 2003, ISBN 8129702282

**Reference Books:**

1. Rab P. Coronel C. "Database Systems Design, Implementation and Management", 5<sup>th</sup> Edition, Thomson Course Technology, 2002, ISBN 981-243-135-7
2. Connally T., Begg C., "Database Systems", 3<sup>rd</sup> Edition, Pearson Education, 2002, ISBN 81-7808-861-4
3. Date C., "An Introduction to Database Systems", 7<sup>th</sup> Edition, Pearson Education, 2002, ISBN 81 -7808-231- 4
4. Ramkrishna R., Gehrke J., "Database Management Systems", 3<sup>rd</sup> Edition, McGraw-Hill, 2003, ISBN 0-07- 123151 –X
5. Atul Kahate, "Introduction to Database Management System", 3<sup>rd</sup> Edition, Pearson Education 2009, ISBN 978-81-317-0078-5.

## 310242: Data Communications

**Teaching scheme:**  
**Lectures: 3 Hrs/Week**

**Examination Scheme:**  
**Theory: 100 Marks**

### **Objectives:**

- To learn and understand basic communication techniques

### **Prerequisites:**

- Discrete Structures
- Electronic devices and communication

### **Unit I: Basics of communication**

Communication System, Baseband and Carrier Communication, transmission modes, Baud rate, bit rate, SNR, Channel Bandwidth and rate of communication, Introduction to analog modulation techniques (AM, FM, PM, QAM) Bandwidth Requirements in analog modulation techniques Digital Continuous Wave Modulation techniques: Modems, ASK, FSK, PSK, BPSK, QPSK Multiplexing techniques: TDM, FDM, WDM, CDMA **(06 Hrs.)**

### **Unit II: Pulse modulation**

Pulse amplitude modulation techniques: sampling theorem, Pulse modulation, PAM, Pulse time modulation, Pulse Transmission over Band Limited Channel, Effect of Gaussian Type Noise on Digital Transmission, Crosstalk Pulse digital modulation techniques: PCM, PCM Encoder and Decoder, DPCM, ADPCM, Delta modulation, Adaptive Delta Modulation, Bandwidth requirement of digital modulation techniques, quantization noise Line Coding techniques: Bipolar, Unipolar, RZ, NRZ, Manchester, AMI, B8ZS, Block coding techniques **(06 Hrs)**

### **Unit III: Information and Coding**

Information rate, Shannon's theorems on channel capacity, Optimum Codes, Huffman Code, Code Efficiency, Error Control Coding, Methods of Controlling Errors, Types of Errors, Types of Codes, Linear Block Codes: Matrix Description of Linear Block Codes, Error detection and correction capabilities, Hamming Distance, Hamming Bound, Hamming Codes, CRC Block Codes, Syndrome Calculation, Error Detection and Correction, Handshaking Techniques, FEC, ARQ - Stop and Wait, Go Back N, Selective Repeat, Channel Throughput and Efficiency. **(06 Hrs)**

### **Unit IV: Communications Technologies & Computer Networks**

Communication technologies: PSTN, DSL technologies SONET, Video on Demand, Bluetooth, Cellular telephony, Broadband wireless technologies Computer Networks: Need and Applications of Network, Protocols and Standards, OSI Model, TCP/IP Model, Network topology (Physical & logical), LAN standards, Ethernet, Wireless LAN, Virtual LAN, DQDB, SMDS, Frame relay, ATM **(06 Hrs)**

### **Unit V : Physical layer**

Transmission media: Guided transmission media - Twisted Pair, Coaxial and Fiber-optic cables, Wireless transmission: Electromagnetic spectrum, Radio and Micro Waves, Infrared, Lightwave, Spread Spectrum Systems, Digital hierarchy– Signaling system, DS lines, T lines, E lines, Cable modem Switching techniques: Circuit switching, Packet switching and message switching,

Network Hardware Components: Connectors, Transceivers and Media Converters, Repeaters, hubs, NICs, Bridges and Switches (06 Hrs)

**Unit VI :Data link control**

Data link layer design issues: Services, Framing, Error and flow control, Stop-and-Wait protocol, Sliding Window protocol, HDLC, Data link layer in Internet and ATM Medium access control sublayer: Channel allocation: Static and Dynamic allocation, Multiple Access Protocols: ALOHA, CSMA, Collision-free and limited-contention protocols, Virtual LANs (06 Hrs)

**Text books:**

1. Lathi B. "Modern Digital and Analog Communication Systems", 3<sup>rd</sup> Edition, Oxford University Press, 2003, ISBN 0-19-511009 - 9
2. Fourauzan B., "Data Communications and Networking", 4<sup>th</sup> edition, Tata McGraw-Hill Publications, 2006, ISBN 0 - 07 – 0634145

**References Books:**

1. Andrew S. Tenenbaum ,”Computer Networks”,4<sup>th</sup> Edition,PHI,ISBN 81-203-2175-8.
2. Stallings W., "Data and Computer Communications", Sixth Edition, Prentice Hall of India Pvt. Ltd., 2002, ISBN 81-203-2067-0
3. Shanmugam K., "Digital and Analog Communication Systems", John Wiley & Sons (Asia) Pvt. Ltd. ISBN 9971-51-146-0
4. Gupta P., "Data Communications", PHI, 2004, ISBN 81 - 203 - 1118 - 3
5. Wayne Tomasi “Introduction to Data Communications and Networking” Pearson Education, 2007, ISBN 81-317-0930-2
6. Godbole A., "Data Communications and Networks", Tata McGraw-Hill Publications, 2002, 0 - 07 - 047297 - 1

# 310243: MICROPROCESSORS AND MICROCONTROLLERS

**Teaching scheme**  
**Lectures: 3 hrs/week**

**Examination scheme**  
**Theory: 100 Marks**

## **Learning objectives:**

- Introduce Intel super-scalar architecture.
- Study of Intel Pentium architecture and programming.
- Study of architecture and programming of 8051 microcontroller.

## **Prerequisite:**

- Microprocessors and Interfacing techniques

### **Unit I: Introduction to Pentium microprocessor (7 hrs.)**

Historical evolution of 80286, 386, 486 processors. Pentium features and Architectures, Pentium Real mode, Pentium RISC features, Pentium super-scalar architecture - Pipelining, Instruction paring rules, Branch prediction, Instruction and Data caches. The Floating point Unit-features, pipeline stages & data types.

### **Unit II : BUS cycles and Memory organization (6 hrs.)**

Initialization and configuration, Bus operations – Reset, Non pipelined and pipelined (read and write). Memory organization and I/O organization. Data transfer mechanism – 8bit, 16bit, 32bit. Data bus interface. Pentium programmers model, Register set, Addressing modes, Data Types, BUS cycle.

### **Unit III: Protected Mode Architecture (7 hrs.)**

Introduction, segmentation, support registers, related instructions, descriptors, memory management through segmentation, logical to linear address translations, protection by segmentation, privilege-level, protection, related instructions, inter-privilege level, transfer control, Paging-support registers, related data structures ,linear to physical address translation ,TLB ,page level protection.

### **Unit IV : Multitasking, Interrupts, Exceptions and I/O (6 hrs.)**

Multitasking -support registers, related data structures, Task switching, Nested task, I/O permission bit map. Virtual mode -features, address generation, privilege level, instruction and registers available, entering and leaving V86 mode. Interrupt structure - real, protected, virtual 8086 mode. I/O handling in Pentium, I/O instructions Comparison of all three modes.

### **Unit V: 8051 Microcontroller- Part I (6 hrs)**

Features, Micro-controller MCS-51 family architecture. Programmers model-register set, register bank, SFR's, addressing mode, instruction set, Memory organization on-chip data memory External data memory and program memory. Memory interfacing-external RAM/ROM interface.

### **Unit VI :8051 Microcontroller- Part II (6 hrs)**

CPU timings, Interrupt structure, Timers and their programming, Serial port and programming, Power saving modes in 8051. Introduction to 8096 Microcontroller - features and architecture.

**Text books:**

1. James Antonakos , “The Pentium Microprocessor” , 2004, Pearson Education  
ISBN – 81-7808-545-3
2. Muhammad Ali Mazidi and Janice Gillispie Mazidi, “ The 8051 Microcontroller and embedded systems”, 2009, Pearson education.  
ISBN – 81-7808-574-7
3. Intel 8 bit Microcontroller manual.
4. Ajay Deshmukh, “Microcontrollers – (Theory and application)” , 2004, TMH  
ISBN 0-07-058595-4
5. Intel 8096 16-bit Microcontroller manual.

**Reference Books:**

1. The 8051 Microcontroller and Embedded systems using Assembly and C.  
(K.J.Ayala/ D.V.Gadre) -Cengage learning ISBN 9788131511053
2. Jeffry and Royer, “IBM PC Hardware and Assembly Language”, BPB Publication
3. 8051 Microcontroller Hardware, Software and applications.  
(V Udayshankara and M.S.Mallikarjunaswamy) (TMH)

# 310244: DIGITAL SIGNAL PROCESSING

## Teaching Scheme

Lectures: 4 Hrs/ Week

## Examination Scheme

Theory: 100 Marks

### Objectives:

- To learn methodology to analyze signals and systems
- Study transformed domain representation of signals and systems
- Design of filters as DT systems
- To get acquainted with the DSP Processors and DSP applications

### Prerequisite:

- Knowledge of basic Engineering Mathematics

### Unit I: Signals and Systems

Continuous time (CT), Discrete-time (DT) and Digital signals, Basic DT signals and Operations. Discrete-time Systems, Properties of DT Systems and Classification, Linear Time Invariant (LTI) Systems, Impulse response, Linear convolution, Linear constant coefficient difference equations, FIR and IIR systems, Periodic Sampling, Relationship between Analog and DT frequencies, Aliasing, Sampling Theorem, A to D conversion Process: Sampling, quantization and encoding. **(09 Hrs)**

### Unit II: Frequency Domain Representation of Signal

Introduction to Fourier Series, Representation of DT signal by Fourier Transform (FT), Properties of FT: Linearity, periodicity, time shifting, frequency shifting, time reversal, differentiation, convolution theorem, windowing theorem. Discrete Fourier Transform (DFT), DFT and FT, IDFT, Twiddle factor, DFT as linear transformation matrix, Properties of DFT, circular shifting, Circular Convolution, DFT as Linear filtering, overlap save and add, DFT spectral leakage **(08 Hrs)**

### Unit III: Fast Fourier Transform (FFT) and Z-Transform (ZT)

Effective computation of DFT, Radix-2 FFT algorithms: DIT FFT, DIF FFT, Inverse DFT using FFT, Z-transform (ZT), ZT & FT, ZT & DFT, ROC and its properties, ZT Properties, Rational ZT, Pole Zero Plot, Behaviour of causal DT signals, Inverse Z Transform (IZT): power series method, partial fraction expansion (PFE), Residue method. **(09 Hrs)**

### UNIT IV: Analysis of DT - LTI Systems:

System function  $H(z)$ ,  $H(z)$  in terms of Nth order general difference equation, all pole and all zero systems, Analysis of LTI system using  $H(Z)$ , Unilateral Z-transform: solution of difference equation, Impulse and Step response from difference equation, Pole zero plot of  $H(Z)$  and difference equation, Frequency response of system, Frequency response from pole-zero plot using simple geometric construction, Ideal frequency selective filters, magnitude and phase response **(08 Hrs)**

### Unit V: Digital Filter Design

Concept of filtering, Ideal filters and approximations, specifications, FIR and IIR filters, linear phase response, FIR filter Design: Fourier Series method, Windowing method, Gibbs Phenomenon, desirable features of windows, Different window sequences and its analysis, Design examples:

IIR filter design: Introduction, Mapping of S-plane to Z-plane, Impulse Invariance method, Bilinear Z transformation (BLT) method, frequency warping, Prewarping, Design examples, Practical filters e.g. Butterworth filters, Comparison of IIR and FIR Filters, Finite word length effect **(08 Hrs)**



## **Unit VI: Filter Structures and DSP Processors**

Basic Structures for FIR Systems: direct form, cascade form, structures for linear phase FIR Systems, Examples

Filter structures for IIR Systems: direct form, cascade form, parallel form, examples.

DSP Processors Architecture Study: ADSP 21XX series: features, comparison with conventional processor, Functional Block diagram: ALU, MAC, Barrel shifter, DAG, Registers

Introduction to Applications of DSP in speech and image processing **(08 Hrs)**

### **Text Books:**

1. Proakis J., Manolakis D., "Digital signal processing", 4<sup>th</sup> Edition, Pearson Education, ISBN 9788131710005
2. Oppenheim A., Schaffer R., Buck J., "Discrete time signal processing", 2<sup>nd</sup> Edition, Pearson Education, ISBN 9788131704929

### **Reference Books:**

1. Babu R., "Digital Signal Processing", 4<sup>th</sup> Edition, Scitech Publications, ISBN 978-81-8371-081-7
2. Mitra S., "Digital Signal Processing: A Computer Based Approach", Tata McGraw-Hill, 1998, ISBN 0-07-044705-5
3. Vallavraj A., "Digital Signal Processing", ISBN 0-07-463996-X
4. Ifeachor E. C., Jervis B. W., "Digital Signal Processing: A Practical Approach", Pearson-Education, 2002
5. S.Poornachandra, B.Sasikala, "DSP", 3<sup>rd</sup> Edition, McGrawHill, ISBN-13:978-07-067279-6

# 310245: THEORY OF COMPUTATION

**Teaching Scheme**  
Lectures: 3 Hrs/Week

**Examination Scheme**  
Theory: 100 marks

## **Objectives:**

- Study abstract computing models
- Learn about the theory of computability and complexity.

## **Prerequisites:**

- Discrete Structures
- Data Structures and Algorithms

## **Unit I: Basic Mathematical Objects**

Sets, Logic, functions, Relations,

**Languages:** Languages in abstract, defining languages, Kleene closure.

**Recursive Definitions:** New method for defining languages, important languages.

**Finite Automata:** An Informal Picture of FA, Deterministic Finite Automaton (DFA): How a DFA processes Strings, Simpler Notations for DFA, Extending the transition function to strings, the language of DFA, Non-deterministic Finite Automaton (NFA): NFA, Extended transition function, the language of an NFA, Equivalence of NFA and DFA, FA with  $\epsilon$ -transitions: Use of  $\epsilon$ -transitions, NFA with  $\epsilon$ ,  $\epsilon$ -closures, Extended transitions and languages for  $\epsilon$ -NFA, Eliminating  $\epsilon$ -transitions- Conversion of NFA with  $\epsilon$  to NFA without  $\epsilon$ , Conversion of NFA without  $\epsilon$  to DFA, Conversion of NFA with  $\delta$  to DFA (direct method), FA with output: Moore and Mealy machines -Definition, models, inter-conversion. **(6 hrs.)**

## **Unit II: Regular Expressions (RE) and Languages**

Regular Expressions - Operators of RE, Building RE, Precedence of operators, Algebraic laws for RE, Arden's Theorem, FA and RE: DFA to RE, RE to DFA (RE to s-NFA &  $\epsilon$ -NFA to DFA and RE to DFA-direct method), FA limitations, Properties of Regular Languages: pumping lemma for regular languages, closure and decision properties of regular languages, Equivalence and minimization of automata, Application of RE: Regular expressions in Unix, GREP utilities of Unix, Lexical analysis and finding patterns in text. **(6 hrs.)**

## **Unit III: Context Free Grammars (CFG) and Languages**

Context Free Grammar- Definition, derivations, languages of a grammar, sentential form, Parse Tree- inference, derivation and parse tree, from inference to tree, Ambiguity in grammars and languages: removal of ambiguity, inherent ambiguity, Properties of CFL- Normal forms- Chomsky Normal Form and Greibach Normal Form(GNF), Eliminating unit productions, useless production, useless symbols, and  $\epsilon$ -productions, Regular Grammar - definition, left linear and right linear Regular Grammar, Regular Grammar and Finite Automata, FA to RG and RG to FA, Inter-conversion between left linear and right linear regular grammar. The pumping lemma for CFL, Closure properties of CFL, Decision properties of CFL, Chomsky Hierarchy, Application of CFG: Parser, Markup languages, XML and Document Type Definitions. **(6 hrs.)**

## **Unit IV: Push Down Automata (PDA)**

Definition, The Language of PDA, Equivalence of PDA's and CFG- CFG to PDA, PDA to CFG, Deterministic Push Down Automata (DPDA) - Regular language and DPDA, DPDA and CFL, DPDA and ambiguous grammar, Non-deterministic Push Down Automata (NPDA). **(6 hrs.)**

## **Unit V: Turing Machine**

Problems that computer cannot solve, The Turing Machine(TM)-Notation, the language of TM, TM and Halting, Programming techniques to TM, Extensions to basic TM, TM and Computers.

**Post Machine:** Introduction to Post Machines, Comparison between FA, PDA, Post Machine and TM **(6 hrs.)**

#### **Unit VI: Recursively enumerable languages**

Recursively Enumerable and Recursive, Enumerating a Language, More General Grammars Context-Sensitive Languages and the Chomsky Hierarchy, Not All Languages are Recursively Enumerable.

**Un-decidability:** A Language that is not recursively enumerable, An un-decidable problem that is RE, Post Correspondence Problem, Other Undecidable Problems. **(6 hrs.)**

#### **Text books:**

1. Hopcroft J., Mptwani R., Ullman J., "Introduction to Automata Theory, Languages and Computations", Third edition, Pearson Education Asia.
2. John C Martin. "Introduction to Language and Theory of Computation", Third edition, Tata McGraw- Hill
3. Daniel Cohen., "Introduction to Computer Theory", Second edition, Wiley Publications (india).

#### **References Books:**

1. Lewis H., Papadimitriou C., "Elements of Theory of Computation", Second edition, Pearson
2. Moret B., "The Theory of Computation", Pearson Education Asia
3. Mishra K., Chandrasekaran N., "Theory of Computer Science (Automata, Languages and Computation)", Second Edition, Prentice Hall of India

## 310246: RDBMS AND VISUAL PROGRAMMING LABORATORY

### Teaching Scheme:

Theory: 2 Hrs/Week

Practical: 4 Hrs/Week

### Examination Scheme:

Term Work: 50 Marks

Practical: 50 Marks

### Objectives:

- To learn and understand Visual Programming Paradigms
- To learn and understand SQL, PL/SQL, Embedded SQL
- To learn any Relational Database such as Oracle/MySQL/SQL Server etc.
- To learn and understand Database Project Life Cycle.

### Part I: Visual Programming Language

Concept of Event Driven Programming, Visual basic 6.0 Integrated Development Environment, **Visual Basic 6.0 Projects** – Standard EXE, ActiveX EXE/DLL, ActiveX user Control, **Visual Basic 6.0** – Data types, Control statements, loops, Array & dynamic array handling, Sub routines & functions, File Handling- sequential files, Binary files, random access files. **Visual Basic 6.0** - Text Box, Command, Label, Picture Box, Image Box, Graphics Control, List Box, Combo Box, Check Box, Option Box, Frame, Image list box, Image combo box, Drive box, Directory list box, File list box, OLE Control, Timer, Rich Text Box, Treeview Control, Progress bar, Tool bar, Status bar, Tab strips, Sliders, Horizontal scrollbar, Vertical scrollbar, Common Dialog Control, Message box, Input box, Menu, Properties, Events & Methods, MDI forms, Control Array, ActiveX DLL, ActiveX user Control.

### Part II: RDBMS - SQL, PL/SQL

Introduction to SQL, Introduction to DDL, DML, DCL, TCL, Data types, Integrity constraints, SQL Operators, SQL SET Operators, SQL Functions -Character, Date, Null Values, Aggregate, Group By, Having Clause, Order By, Joins, Subquery, Multi table Inert & Merge, Case Expression.

**DDL Statement** : Create, Alter, Drop – Table, View, Index, sequence, and synonyms, User, Role

**DML Statement**: Insert, Select, update, Delete – Table, View

**DCL Statement** : Grant, Revoke

**TCL Statement** : Commit, Rollback, Save Point

Introduction to PLSQL, PL/SQL Block, Data types, Control structure, Loops, Operators

**Cursors** : Implicit, Explicit, REF., Collection and Record

**Sub Program** : Stored Functions & Stored Procedures, Package

**Database Triggers** : Row level & Statement level.

**Exception Handling** : Built in Exception & User defined Exception

**Embedded SQL and Dynamic SQL**

### Part III : Mini Project : Database Project Life Cycle

- **Project Requirement Gathering and Scope**
- **Database Analysis and Design**
  - Design Approach – Bottom Up, Top Down, inside – Out, Mixed strategy.
  - Design Entity Relationship Model
  - Relational Model

## Database Normalization

- **Implementation :**
  - Front End :** Visual Basic 6.0
  - Backend :** Oracle/ MySQL / SQL Server
  - Report :** Data Report
  - Database Programming :** ODBC, OLEDB, ADO, RDO
- **Testing : Form Validation**

**Group of students should submit the Project Report** which will be consist of Title of the Project, Abstract, Introduction, scope, Requirements, Entity Relationship Diagram with EER features, Data Dictionary, Relational Database Design, Database Normalization, Graphical User Interface, Source Code, VB Forms and Data Reports, Testing document, Conclusion.

*Instructor should maintain progress report of mini project throughout the semester from project group and assign marks as a part of the term work*

### **Suggested List of Assignments**

#### **Part I : Visual Programming (Visual Basic 6.0)**

1. Design and Develop Scientific Calculator using control array
2. Design and Develop Menu driven Text & Image editor
3. Design and Develop an application which demonstrates the use of Drive box, Directory list box, File List box and Tree view control
4. Design and Develop a program for animation(traffic signal, bouncing ball, flying butterfly)
5. Design and Develop features of Paint Brush application
6. Design and Develop ActiveX user control (numeric text box, string manipulation function)
7. Set Properties, Methods, Events, and demonstrate the use of ActiveX Control in Standard
8. EXE project
9. Design and Develop ActiveX DLL for linear search & binary search and demonstrate the use of ActiveX DLL in Standard EXE project
10. Develop a program for Sequential and Random Access file handling.
11. Design student Information form using Visual Basic 6.0 and Implement validation for Text, Number, Email, Length, Upper Case, Lower Case, Date, Password, Character matching etc.

#### **Part II : RDBMS – SQL, PL/SQL**

1. Design and Develop SQL DDL statements which demonstrate the use of SQL objects such as Table, View , Index, Sequence, Synonym
2. Design at least 10 SQL queries for suitable database application using SQL DML statements: Insert, Select, Update, Delete with operators, functions, set operators, Clauses.
3. Design at least 10 SQL queries for suitable database application using SQL DML statements: all types of Join, Sub-Query and View.
4. Write a PL/SQL block to calculate the grade of minimum 10 students.
5. Write a PL/SQL block to implement all types of cursors.
6. Write a PL/SQL stored procedure and function.
7. Write a database Trigger (Row level and Statement level).
8. Implement Embedded SQL queries using C/C++ as host language.

The problem definition should allow the use of cursors and all commonly used command and bi-directional transfer of information (Between host language data items and backend Database)

### **Part III: Mini Project : Database Project Life Cycle**

1. Design Employee Information form using Visual Basic 6.0. Implement Database navigation operations ( add, delete, edit etc. ) using ODBC/OLEDB.
2. Write a program in Visual Basic 6.0 to access stored procedure and functions using ODBC/OLEDB

#### **Instructions:**

- ✓ Instructor should frame minimum six Practical Assignments on **Part I**
- ✓ Instructor should frame minimum six Practical Assignments on **Part II ( SQL : 3 & PL/SQL : 3 )**
- ✓ Instructor should frame a Practical Assignment on embedded SQL
- ✓ Instructor should frame minimum two Practical Assignments and Develop mini project on **Part III**
- ✓ Submission of each Practical Assignment should be in the form of handwritten write-ups, printout of source code and output
- ✓ Instructor should assign a mini project to a group of 3 - 4 students based **Part III**
- ✓ Practical Examination will be based on the all topics covered from Part I, Part II & Part III and questions will be asked to judge understanding of practical performed at the time of practical examination

#### **Reference Books:**

1. “ Visual Basic 6 Programming - Black Book”, DreamTech Press
2. “ Mastering Visual Basic 6 ”, Envagelos Petroustos, bpb Publication
3. “ Visual Basic 6 Programming ”, Tata McgrawHill ,Content Development Group
4. “ SQL and PL/SQL for Oracle 10g Black Book”, Dr. P.S.Deshpande, DreamTech
5. “ SQL, PL/SQL: The Programming Language of Oracle”, Ivan Bayross, BPB Publication
6. “ Oracle 9i/10g The Complete Reference”, Kevin Loney, George Koch, Tata McGraw Hill
7. “ Managing and Using MySQL”, Reese G., Yarger R., King T., Williams H, 2nd Edition, Shroff Publishers and Distributors Pvt. Ltd., ISBN 81 - 7366 - 465 – X
8. “ SQL Server – Black Book”, Dalton Patrik, DreamTech Press

## 310247: SIGNAL PROCESSING LABORATORY

Teaching Scheme:  
Practical: 4 Hrs/week

Examination Scheme  
Term Work: 25 Marks  
Oral: 50 Marks

### Suggested List of Assignments

#### Part I

1. Find the output of a given system for given input sequence using linear convolution.
2. Write a C program to generate samples of sine, Cosine and exponential signals at specified sampling frequency and signal parameters. (Test the results for different analog frequency (F) and sampling frequency (Fs) )
3. Find the output of a system described by given difference equation and initial conditions for given input sequence. (Solution of difference equation) (Obtain the response for different systems by changing Degree of difference equation (N) and coefficients and also for different input sequence  $x(n)$ . Observe the response by considering system as FIR and IIR system)

#### Part II

1. Write a C program to plot the magnitude and phase response of a Fourier Transform (FT). (Observe the spectrum for different inputs. Observe the Periodicity.)
2. Find the N point DFT / IDFT of the given sequence  $x(n)$ . Plot the magnitude spectrum  $|X(K)|$  Vs  $K$ . (Analyze the output for different N and the same input sequence  $x(n)$ . Also observe the periodicity and symmetry property)
3. Compute N point DFT using linear transformation matrix.
4. Find the N point circular convolution of given two sequences. Test it for linear convolution
5. Compute the circular convolution of given two sequences using DFT and IDFT.

#### Part III

1. Implement the N-point radix-2 DIT or DIF FFT algorithm to find DFT or IDFT of given sequence  $x(n)$ . (Analyze the output for different N Program should work for any value of N (generalized))
2. Find DFT of a given sequence using Goertzel algorithm. (Analyze the output for different N)
3. Draw a pole zero plot from a given system function  $H(Z)$  expressed as rational function. (Display pole zero table and pole zero plot)
4. Write a C program to plot the magnitude and phase response of a given system ( given:  $h(n)$ : impulse response of system S) (Observe the frequency response for different systems. Compare the frequency response of a system (filter) for different length  $h(n)$  i.e filter coefficients)

#### Part IV

1. Obtain the Fourier transform of different window functions. Plot the magnitude and phase spectrums. (Observe and compare the desirable features of window sequences. Observe the main and side lobes)
2. Design an FIR filter from given specifications using Fourier Series method
3. Design an FIR filter from given specifications using windowing method ( Program should work for different types of filter specifications i.e LPF, HPF, BPF etc and all window sequences. Plot the frequency response for different frequency terms i.e. analog and DT frequency)

4. Design of IIR filter for given specifications using Bilinear Transformation. (Program should work for different types of filter specifications i.e LPF, HPF, BPF etc and for different transfer functions of an analog filter)
5. Study of DSP Processor

**Note:**

- All Assignments should be developed in C/C++. [Compare the output(s) of at least **six** programs with the output of any software package related to signal processing like Sigview/Octave/Matlab etc]
- Students will submit Term Work in the form of a Journal, which includes at least **13** assignments as mentioned below **plus** study assignment on DSP Processor.
- Assignments: **All 3** from **Part I** + **Any 4** from **Part II** + **Any 3** from **Part III** (assignment on Implementation of FFT algorithm is compulsory) + **Any 3** from **Part IV**.
- Each assignment should include algorithm analysis and program listing.
- Oral Examination will be based on the **Theory** and **Term Work** (Subject knowledge and assignments )

**Text Books:**

1. Ingale V., Proakis J., "Digital Signal Processing :A MATLAB based approach " , Cengage Learning , ISBN 9788131509050
2. Schuler C., Chugani M, "Digital Signal Processing- A hands on Approach", Tata McGraw-Hill Edition, ISBN 0-07-058966-6
3. Herniter M., "Programming in Matlab", Cengage Learning , 1<sup>st</sup> Edition 2009
4. ISBN 978-81-315-1060-5

**Reference Book:**

1. Manuals - ADSP 21XX family DSP.



## 310248: HARDWARE LAB

**Teaching scheme**  
**Practical: 4 hrs/week**

**Examination scheme**  
**Practical: 50 Marks**  
**Term Work: 25 Marks**

1. Write an ALP to simulate TYPE command using PSP.
2. Write an ALP to simulate COPY command using PSP.
3. Write an ALP / in line code for displaying boot sector of floppy and boot record of hard disk.
4. Write an ALP / in line code for displaying file content using root directory and FAT for floppy disk.
5. Write an installable DOS device driver for printers.
6. Write a C program for PC to PC communication.
  - a. File Transfer
  - b. Full duplex character transfer (chat application)
7. Write ALP for Mouse interface (Assignment old as it is)
8. Write ALP for DPMI (Assignment old as it is)
9. Study of Pentium motherboard.
10. Write ALP to implement multitasking using Pentium programming.
11. Write an 8051 ALP for rate generation using Timer0/Timer1 by using
  - a. Polling method
  - b. ISP method
12. Write an 8051 ALP for serial port programming to transfer block of data using
  - a. Polling method
  - b. ISP method
13. Write an 8051 ALP to interface stepper motor for following operations
  - a. Full step
  - b. Half step
  - c. Clock wise
  - d. Anticlockwise

## TE TERM-II

### 310249: PRINCIPLES OF PROGRAMMING LANGUAGES

**Teaching Scheme**  
**Lectures: 3 Hrs/Week**

**Examination Scheme**  
**Theory: 100 Marks**

#### **Objectives:**

- To understand the basic building blocks of programming languages.
- To learn and understand various programming paradigms.

#### **Prerequisites:**

- Data Structures and Algorithms
- Theory of Computation

#### **Unit I: Introduction**

Role of programming languages, need to study programming languages, characteristics of a good programming languages, Introduction to various programming paradigms: Procedural, object-oriented, logic and functional programming, Parallel Programming, Concurrent Programming  
**Data Types:** properties of structured and non-structured data types and Objects, variables, constants, Derived and abstract data types, declaration, type checking. Binding and binding times, type conversion, scalar data type, composite data types, Implementation and Storage representation of data types and control flow statement.

**Procedures:** Procedure call and return, recursive subprogram, Different parameter passing methods, Lifetime of variables, Scope rules: Static and Dynamic scope, Referencing environment: activation records (Local, Non local and Global), Storage management (static and Dynamic), Exceptions and exception handling **(8 Hrs)**

#### **Unit II: Procedural Programming**

Design Principles, Control flow: statement-oriented and block-oriented structure programming, Execution steps, desirable and undesirable characteristics of procedural programming.

**Procedural Programming with Pascal:** Program structure, Lexical elements, Data Types, Operators and punctuators, variable and type declarations, I/O, type conversion, control structures: conditional and iterative, arrays, procedures and functions, local and global variables, nested procedures and scope rules, pointers, parameter passing, User defined data types, comparative study of C and PASCAL **(6 Hrs)**

#### **Unit III: Object Oriented Programming**

Design Principles: Objects, classes, Messages and methods, Implementation of Object-oriented Programming, **Object oriented programming with Java:** Program structure, Object and class declarations, constructors, inheritance, polymorphism, access specification, interfaces, packages, exception handling, Java I/O, Java applications and applets, introduction to Java threads and multithreading, **Socket Programming, JDBC,** Comparative study of C++ and Java. **(6 Hrs)**

#### **Unit IV: Introduction to .NET Technology and C#:**

Brief introduction to Microsoft .NET - The Microsoft .NET platform, .NET framework, advantages, introduction to C#, type system, classes, method, Properties, Arrays, Interfaces, Delegates and event handlers, Assemblies and Modules, late binding, creating and executing code at Run Time, Multithreading Patterns, Exception Handling. **(6 Hrs)**

### **Unit V: Logic Programming**

Logic programming language model, logical statements, resolution, unification, search structures: backward and forward, Applications of logic programming

**Logic Programming with Prolog:** Program structure, logical variable, syntax structure, Control structure, resolution and unification, depth-first search, backtracking, cut operator, recursive rules, Prolog facilities and deficiencies **(6 Hrs)**

### **Unit VI: Functional Programming**

Introduction to functional programming, Lambda calculus: Ambiguity, free and bound identifiers, reductions, typed lambda calculus, application of functional programming

**Functional Programming with LISP:** Elements of functional Programming, Function declaration, Expression evaluation, type checking **(6 Hrs)**

### **Text Books:**

1. Roosta S., "Foundations of Programming Languages", Thomson Brookes/Cole, ISBN 981 -243-141-1
2. Sethi R., "Programming Languages concepts & constructs", 2<sup>nd</sup> Edition, Pearson Education, ISBN 81 - 7808 - 104 – 0

### **References Books:**

1. Scbesta R., "Concepts Of Programming Languages", 4<sup>th</sup> Edition, Pearson Education, ISBN-81-7808-161-X
2. Balagurusamy E., "Programing with C#", Tata McGraw-Hill, 2002, ISBN 0 - 07 -047339-0
3. K.Venugopal., "Programming in Turbo PASCAL", Tata-McGraw Hill,
4. Herbert Schildt "The Complete Reference Java2", 5<sup>th</sup> Edition, Tata McGraw-Hill 0 - 07-049543-2
5. Winston P., Klaus B., Horn P., "LISP", 3<sup>rd</sup> Edition, Pearson Education, 81 - 7808 -155-5
6. Carl Townsend ,”Programming in turbo PROLOG”, Tata-McGraw Hill

# 310250: COMPUTER NETWORKS

**Teaching Scheme**  
**Lectures: 3 Hrs/Week**

**Examination Scheme**  
**Theory: 100 Marks**

## **Objectives:**

- To understand the Network Architecture.
- To learn and understand various Networking Protocols & Layers .

## **Prerequisites:**

- Data Communication & Networking

## **Unit I: Introduction to computer network and internet**

What is internet? Network edge, Network core, Protocol layers and services model, Network standardization. Introduction to application layer services, DNS, HTTP, FTP, SMTP, DHCP, TELNET. **(06 hrs.)**

## **Unit II: Transport Layer**

Transport services, Connection management, UDP, TCP, Socket Programming(TCP & UDP),TCP Flow control, TCP Congestion Control. **(08 hrs.)**

## **Unit III: Quality of service and Traffic Management**

Introduction to quality of services, scheduling, congestion control, differentiated services, integrated services, RSVP. **(06 hrs)**

## **Unit IV: Internetworking**

Network Layer design issues, IPV4, IPV6, ARP, RARP, ICMP(V4&V6) **(06 hrs.)**

## **Unit V : Routing Principles**

Introduction to IP routing, Classification of routing algorithms, distance vector, link state, hierarchical, adhoc Net, MACA, MACAW. Routing protocols-RIP, OSPF, BGP, IGRP. **(08 hrs)**

## **Unit VI: Lower level protocols and implementation**

HDLC, PPP protocols, internetworking devices like hubs, switches, routers, bridges. Link virtualization (ATM, MPLS) **(06 Hrs)**

## **Text books:**

1. Kurose, Ross, “ Computer Networking-a top down approach featuring the internet “,Pearson Education
2. Andrew S. Tenenbaum ,”Computer Networks”,4<sup>th</sup> Edition,PHI,ISBN 81-203-2175-8.

## **References Books:**

1. Fourauzan B, “Data communication and Computer Networks”, Tata McGraw Hill)
2. Olifer & Olifer ,”Computer Networks-principles, technologies & protocols for network design”, WILEY
3. Comer D, “Computer networks and internet”, Pearson Education

# 310251: FINANCE & MANAGEMENT INFORMATION SYSTEMS

**Teaching Scheme:**  
**Lectures: 3 Hrs/Week**

**Examination Scheme:**  
**Theory: 100 Marks**

## **Unit I: Basic of management theory & practice**

Evolution of management thoughts, system approach to management process, functions of manager, social responsibilities of manager. International management and Multinational Corporation, cultural differences in international management. Quality perspective, HR management and selection, performance appraisal and carrier strategies **(6 hrs)**

## **Unit II: Finance**

Overview of financial management: goal of financial management, fundamental principle of finance, risk return trade off, forms of business organization. **Financial statements taxes and cash flow:** balance sheet, profit and loss account, finance topics, taxes, free cash flow. Time value of money: time lines and notations, present and future value of single amount. **Mergers & acquisition:** Mergers, acquisition, takeover, privatization, Divestitures. Corporate Security: Share, debentures & International Security **(8 hrs)**

## **Unit III: Basics of MIS -Decision making:**

Concepts, process and organizational decision making, role of MIS in decision making. Development process of MIS: MIS plan, development & implementation of MIS. Strategies design of MIS, business process reengineering, relevance of IT, DSS concepts, philosophy and application, knowledge management and system. **(8 hrs)**

## **Unit IV: E-business**

**E-business enterprise:** Organization of business in digital form, e-business, e-commerce, e-communication, e-collaboration and real time enterprise. Modern business technology: security and businesses, web enabled business management, CMS, ECM, enterprise portal. **(6 hrs)**

## **Unit V : Enterprise and global management**

Enterprise management system: EMS, ERP, SCM, CRM. Information security challenges, Global management: outsourcing and off-shoring, cultural, political and economical challenges, global business IT strategies and applications, global IT platform, global data access issues. **(6 hrs)**

## **Unit VI: Laws and case studies**

Law: cyber law, IT act, right to information act, IPR law, IT impact on society.

Case studies: Refer case studies given in the text book **(6 hrs)**

## **Text books:**

1. W.S. Jawadekar, "Management information system, text and cases: A digital firm perspective" 4<sup>th</sup> edition, Tata Mcgraw hill, 2009
2. J.A.O'Brien, "Management information system", 9<sup>th</sup> edition, Tata Mcgraw hill, 2009
3. H. Koontz, "Essentials of management: An international perspective", 8<sup>th</sup> edition, Tata Mcgraw hill, 2010
4. P. Chandra, "Financial management theory and practice", 6<sup>th</sup> edition, Tata Mcgraw hill, 2007

## **References Books:**

1. P.K.Goel, "Business law for managers", priztantra, 2009
2. V. Sharan, "Fundamentals of financial management", Pearson, 2<sup>nd</sup> edition
3. E.Turban, "Information technology for management", 6<sup>th</sup> edition, Wiley edition, 2008
4. R. Mclead, "Management information system", 10<sup>th</sup> edition, Pearson

# 310252: SYSTEMS PROGRAMMING AND OPERATING SYSTEMS

**Teaching Scheme:**  
**Lecturers: 4 Hrs/Week**

**Examination Scheme:**  
**Theory: 100 Marks**

## **Objectives:**

- To understand the concepts and components of Systems Programming
- To Learn and understand the fundamentals of Operating systems
- To study the operations performed by Operating System as a resource manager.

## **Prerequisites:**

- Data Structures
- Computer Organization
- C programming

## **Unit I: Introduction to Systems Programming**

**Introduction:** Components of System Software, Language Processing Activities, Fundamentals of Language Processing.

**Assemblers:** Elements of Assembly language programming. Simple assembler scheme, Structure of an assembler, Design of single and two pass assembler

**Macro Processors:** Macro Definition and call, Macro expansion, Nested Macro Calls, Advanced Macro Facilities, Design of a two-pass and nested macro-processor **(10 hrs)**

## **Unit II: Loaders and Linkers**

**Loaders:** Loader Schemes: Compile and go, General Loader Scheme, Absolute loaders, subroutine linkages, relocating loaders, direct linking loaders, overlay structure, Design of an absolute loader, design of direct linking loader.

**Linkers:** Relocation and linking concepts, Design of linker, self relocating programs, Static and dynamic link libraries, use of call back functions, Dynamic linking with and without import **(8 hrs)**

## **Unit III: Introduction to OS and Process management**

**Introduction to OS :**Architecture, Goals & Structures of O.S, Basic functions, Interaction of O. S. & hardware architecture, System calls, Batch, multiprogramming. Multitasking, time sharing, parallel, distributed & real -time O.S.

### **Process Management**

Process Concept, Process states, Process control, Threads, Uni-processor Scheduling: Types of scheduling: Preemptive, Non preemptive, Scheduling algorithms: FCFS, SJF, RR, Priority, Thread Scheduling, Real Time Scheduling. System calls like ps, fork, join, exec family, wait. **(6 hrs)**

## **Unit IV: Concurrency control**

**Concurrency:** Principles of Concurrency, Mutual Exclusion: S/W approaches, H/W Support, Semaphores, pipes, Message Passing, signals, Monitors, Classical Problems of Synchronization: Readers-Writers, Producer Consumer, and Dining Philosopher problem.

**Deadlock:** Principles of deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, System calls like signal, kill. **(8 hrs)**

## **Unit V: Memory Management**

Memory Management requirements, Memory partitioning: Fixed and Variable Partitioning, Memory Allocation: Allocation Strategies (First Fit, Best Fit, and Worst Fit), Fragmentation, Swapping, and Paging. Segmentation, Demand paging

Virtual Memory: Concepts, management of VM, Page Replacement Policies (FIFO, LRU, Optimal, Other Strategies), Thrashing. (7 hrs)

### **Unit VI: I/O & File management**

**I/O management & Disk scheduling:** I/O Devices, Organization of I/O functions, Operating System Design issues, I/O Buffering, Disk Scheduling (FCFS, SCAN, C-SCAN, SSTF), RAID, Disk Cache.

**File Management: Concepts,** File Organization, File Directories, File Sharing, Record Blocking, Allocation methods, Free Space management (6 hrs)

#### **Text books:**

1. Stalling William, "Operating Systems" , Pearson Education, fifth edition.
2. John J. Donovan," Systems programming" ,TMGH

#### **References Books:**

1. Beck L., "System Software: An Introduction to Systems Programming", 3<sup>rd</sup> Edition Pearson Education
2. Milan Melankovic "Operating systems"., Second edition ,TMGH.
3. Silberschatz A., Galvin P., Gagne G., "Operating System Concepts ", John Wiley and Sons, 8<sup>th</sup> Edition.
4. Petzold C., "Programming Windows", 5<sup>th</sup> Edition, Microsoft Press, 81-7853- 007-4
5. Dhamdhare D.M., "Systems Programming and Operating Systems", 2<sup>nd</sup> revised Edition, TMGH
6. Adam Hoover, "System Programming with C and UNIX", Pearson Education  
Sibsankar Haldar, Alex A Arvind, "Operating Systems", Pearson Education

# 310253: SOFTWARE ENGINEERING

**Teaching Scheme**  
**Lectures: 3 Hrs/Week**

**Examination Scheme**  
**Theory: 100 Marks**

## **Objectives:**

- To learn and understand the Concepts of Software Engineering
- To Learn and understand Software Development Life Cycle
- To apply the project management and analysis principles to S/W project development.
- To apply the design & testing principles to S/W project development.

## **Unit I: Introduction To Software Engineering**

Nature of Software, Software Process, Software Engineering Practice, software Myths, Generic Process model, Process Models: Waterfall Model, Incremental Models, Evolutionary Models, Concurrent, Specialized Process Models, Personal and Team Process Models, Agile Process models: Agile process, Extreme programming. **(06 Hrs)**

## **Unit II: Requirements Engineering**

Requirements Engineering, Initiating the process, Eliciting Requirements, Building the Requirements Model, Negotiating, Validating requirements, Requirements Analysis, Scenario-Based Analysis, Requirements Modeling strategies, Flow-Oriented Modeling, Class based modeling, SRS. **(06 Hrs)**

## **Unit III: Design Engineering**

Design Process, Design Concepts, The Design Model: Data Design, Architectural, interface Design Elements.

**Architectural Design:** Software Architecture, Architectural Styles, Architectural Design, User Interface Design: Rules, User Interface Analysis and Design, Applying Interface Design Steps, Issues, Web App Interface Design Principles **(06 Hrs)**

## **Unit IV: Testing**

**Testing Strategies:** A Strategic approach to Software Testing, Strategic Issues, Testing Strategy for Conventional Software and Object-Oriented Software, Testing strategies for Web App, Validation Testing, System Testing, Validation and Verification, Debugging.

**Testing Tactics:** Testing Fundamentals, White Box Testing: Basis Path Testing, Control Structure Testing, Black Box Testing. **(06 Hrs)**

## **Unit V: Project management Concepts**

Management Spectrum, people, product, process, project, critical practices, Process and project Metrics: Metrics in process and project domains, software measurement metrics for software quality, Estimation for software project: project planning process, software scope and feasibility, resources, Decomposition Techniques, Empirical Estimation Models, Estimation Empirical, Estimation for Object Oriented project ,Specialized Estimation techniques, Make by decision. **(06 Hrs)**



## **Unit VI: Project Planning**

Risk Management: Reactive versus proactive Software Risk, Risk Identification, risk projection, risk refinement, risk mitigation, monitoring & management, The RMMM plan. Project Scheduling: Task set for Software project, defining a task network, scheduling, earned value analysis, Product Metrics: A framework for product metrics, Software Quality: Software Quality Factors, **Software configuration management**: software configuration management, the SCM Repository, SCM process. **(06 Hrs)**

### **Text Books:**

1. Pressman R., "Software Engineering, A Practitioners Approach", 7<sup>th</sup> Edition, Tata McGraw Hill Publication, 2010, ISBN 978-007-126782-3

### **Reference Books:**

1. Mall R., "Fundamentals of Software Engineering", Second Edition, Prentice Hall India, 2004, ISBN 81 -203-2445-5
2. Vliet H., "Software Engineering Principles and Practices", Second Edition, John Wiley and Sons, ISBN 9971-51-357-9
3. Sommerville "Software Engineering" 8<sup>th</sup> Edition, Person Education
4. Behfarooz A., Hudson F., "Software Engineering Fundamentals", Oxford University Press, 2002, ISBN 0-19-510539-7
5. Pankaj Jalote "An Integrated Approach to Software Engineering" ,Third Edition, Springer .

## 310254: SOFTWARE LABORATORY

**Teaching scheme:**  
**Practical: 4 Hrs/Week**

**Examination scheme:**  
**Practical: 50 marks**  
**Term work: 25 marks**

### List of assignments

1. Design suitable data structures and implement pass-I of a two-pass assembler for 8 bit microprocessor/ pseudo-machine. Implementation should consist of a few instructions from each category and few assembler directives
2. Implement pass-II of a two-pass assembler for 8-bit microprocessor/ pseudo-machine. The output of assignment-1 (intermediate file and symbol table) should be input for this assignment.
3. Design suitable data structures and implement pass-I of a two-pass macro-processor.
4. Write a program for pass-II of a two-pass macro-processor. The output of assignment-3 (MNT, MDT and file without any macro definitions) should be input for this assignment

**NOTE: For Above 4 assignments use proper table handling techniques like hashing**

5. Write a program to create Dynamic Link Library for any mathematical operation and write an application program to test it
6. Write a program to implement following scheduling algorithms
7. First Come First Serve, Shortest Job First (Preemptive), Priority/Round-Robin (Non-Preemptive).
8. Write a program to implement following scheduling algorithms: 1. Least Recently Used 2. Optimal page replacement
9. Write a program to implement Reader-writer problem using mutex/ semaphore
10. 9 Write a program to implement Banker's Algorithm
11. Implement producer-consumer algorithm using multi-threading concept
12. Study UNIX system calls like ps, fork, join, exec family, wait. for process management
13. Study of kernel, types of kernel, UNIX/ Linux kernel re-compilation.

### Instructions:

Students must submit the term-work in the form of journal. Each assignment has to be well documented. Staff in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments. Operating systems assignments should be STRICTLY conducted using Open-Source platform

### Reference Books:

1. Adam Hoover, "System Programming with C and UNIX", Pearson Education
2. Richard Stevens: Advanced Programming in the UNIX environment, Pearson Education
3. "Beginning Linux Programming", Wrox Press

Note: The practical examination will be based on the assignments performed by the candidates as part of the term-work. Questions will be asked during the practical examination to judge the understanding of the students. It is expected that the student know the theoretical aspect of the problem.

## 310255: COMPUTER NETWORKS LABORATORY

**Teaching Scheme:**  
**Theory: 1 Hr/Week**  
**Practical: 4 Hrs/Week**

**Examination Scheme:**  
**Term Work: 25 Marks**  
**Oral: 50 Marks**

Instructor should conduct classroom lectures and demonstrations to cover following topics

- HTML and XHTML: Introduction, Basic Syntax, HTML Document structure, HTML Tags, Text formatting, Graphic Objects, Lists, Tables, Frames, Forms, Style Sheets, Prominent features of HTML Editor such as MS Front Page
- XML: Introduction, Syntax, XML Document structure, Document Type Definitions (DTDs), XML Schema, CSS and XSLT
- Introduction to client-side scripts using VBScript/JavaScript
- PHP: Introduction, General syntax, Primitives, Operations, Expressions, Control statements, Arrays, Functions, Form Handling, Session Tracking, Cookies, Database Connectivity and Access
- Case Study of a Campus Network, design details, trouble shooting
- Demonstration of a protocol analyzer tool
- Network Configuration and Administration in Linux and Windows

### Suggested List of Assignments

1. Setting up a small network(2PC's, 4 PC's) and configuration for sharing resources.
2. Study of protocol analyzer (Ethereal)Packet analysis (wireshark)
3. Installing and configuring DHCP server(windows 2003 server) ,Linux
4. Studying Linux network configuration and commands.
5. Installation and configuration web server(Client-server based)
6. Write a program using socket programming for TCP preferably in C.
7. Write a program using socket programming for UDP preferably in C.
8. Design a website using HTML for any application.
9. Design dynamic web pages and validate them using VB script or JAVA script.
10. Write a PHP script to access the data from assignment no 9

(Note: Instead of assignments 8, 9 & 10 lab teacher can frame a mini, web based project in a group of 3 to 4 students)

11. Write a program to create TCP/IP packet using standard TCP/IP include files and send it to the server [Linux platform].
12. Create a DTD for a catalog of cars, where each car has the child elements and two or three child elements have their own child elements, each of these elements are required and has the possible values Yes or No. Create an XML document with instances of the car elements defined in the DTD and process this document using the DTD and produce a display of raw XML document. Create an XML schema and CSS style sheet for the above-mentioned XML document. Create an XSLT style sheet for one car element of the XML document and use it to create a display of that element.

# 310256: SOFTWARE DEVELOPMENT TOOLS LABORATORY

**Teaching Scheme:**  
**Practical: 2Hrs/Week**

**Examination Scheme:**  
**Term Work: 50 Marks**

## Objectives

- To implement principles of software engineering.
- To motivate students to learn latest technologies.
- To enhance leadership, team member and communication qualities among students.
- To motivate students for self learning and lifelong learning.
- To bridge the gap between curriculum and industry demand.

## 1. Assignments

Instructor should frame six assignments based on one of the following group of technologies

- **Part I: .NET Technology**
  - 1) ASP
  - 2) C#
  - 3) VC++
- **Part II: Java Technology**
  - 1) J2EE
  - 2) J2ME
- **Part III: Rich Internet Application**
  - 1) Flex
  - 2) Flash
  - 3) Cold Fusion
- **Part IV**

Any other technology which is demanded by industry.

## 2. Mini Project

Students should work in a group of 2 to 4 for each project. They should come up with project topic in the area of systems or business applications. They are free to choose any latest technology for implementation of project. The group should work on following phases of software development lifecycle.

- 1) Requirement Analysis
- 2) System Design
- 3) Coding
- 4) Testing

## Instructions:

Students should submit Term Work in the form of journal that should include at least six assignments and a mini project. Each assignment should consist of laboratory work such as design, write-up, algorithm, important test cases, program listing with proper documentation and printout if any. A mini project should consist of 15-20 pages report and softcopy of project.

**Reference Books:**

1. Prorise J., "Programming Windows with MFC", Second Edition, Microsoft Press, 1999, ISBN 81-7853-012-0
2. Kruglinski D., Sheperd, Wingo, "Programming Microsoft Visual C++", Fifth Edition, Microsoft press, ISBN 81-2853-005-8
3. Stephen Walther, "ASP .NET 3.5 Unleashed", Pearson Education, 2008, ISBN 9788131719466
4. Kogent, "C# 2008 Programming Black Book", Wiley, 2008, 9788177228328
5. McGovern, "J2EE 1.4 Bible", Wiley, 2005, ISBN 8126504536
6. Michael J. Yuan, "Enterprise J2ME: Developing Mobile Java Applications", Pearson Education, 2004, ISBN 9788131704387
7. Adobe, "Adobe Flash CS3 Professional Classroom in a Book", Pearson Education, 2007, ISBN9788131715765
8. Balderson, Peter Ent, Heider, Et. Al., "Professional Adobe Flex 3", Wiley, 9788126521692.
9. Adam Phillip Churvis, "Cold Fusion MX Bible", Wiley.

## 310257: SEMINAR AND TECHNICAL COMMUNICATION

**Teaching Scheme**  
**Practical: 2 Hrs/Week**

**Examination Scheme**  
**Term Work: 50 Marks**

### **Objective:**

- To explore the basic principles of communication (verbal and non-verbal) and active, empathetic listening, speaking and writing techniques.
- To expose the student to new technologies, researches, products, algorithms, protocols etc.

### **Instructions for student**

- Each student will select a topic in the area of Computer Engineering and Technology preferably keeping track with recent technological trends and development.
- The topic must be selected in consultation with the institute guide.
- Each student will make a seminar presentation in the term making use of audio/visual aids for a duration of 20-25 minutes and submit the seminar report in the form of bound journal (two copies) duly signed by the guide and Head of department.
- Attendance at seminars for all students is compulsory.
- A panel of staff members from the institute will assess the seminar internally during the presentation.

### **Format of the Seminar Report**

- Title Page with Title of the topic, Name of the candidate with Exam Seat Number, Roll Number, Name of the Guide, Name of the Department, Institution and Year
- Seminar Approval Sheet
- Abstract
- Table of Contents, List of Figures, List of Tables and Nomenclature
- Introduction with section describing organization of the report
- Literature Survey
- Details of Analytical and/or experimental work, if any
- Discussions and Conclusions
- Acknowledgement,
- References

### **Note:**

1. The total workload of the seminar head can be calculated as follows:  
Total Workload = (Number of students\*2)/9
2. The maximum number of seminars assigned to every eligible faculty should not be more than 9.