TE (Computer Engineering)

Semester I

Sub Code	Subject	Teaching Scheme		Examination Scheme				Marks
		Lect	Pract	Th	Tw	Pr	Or	
310241	Database Management Systems	03	—	100	—	—	—	100
310242	Data Communications	03	—	100	—	—	—	100
310243	Microprocessors and Microcontrollers	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	75
310248	Hardware Laboratory	—	04	—	25	50	—	75
	Total	**18**	**12**	**500**	**100**	**100**	**50**	**750**

Semester II

Sub Code	Subject	Teaching Scheme		Examination Scheme				Marks
		Lect	Pract	Th	Tw	Pr	Or	
310249	Principles of Programming Languages	04	—	100	—	—	—	100
310250	Computer Networks	03	—	100	—	—	—	100
310251	Management Information Systems	03	—	100	—	—	—	100
310252	Systems Programming	03	—	100	—	—	—	100
310253	Software Engineering	03	—	100	—	—	—	100
310254	Software Laboratory	—	04	—	25	50	—	75
310255	Computer Networks Laboratory	02	04	—	25	—	50	75
310256	Software Development Tools Laboratory	—	02	—	50	—	—	50
310257	Seminar and Technical Communication	—	02	—	50	—	—	50
	Total	**18**	**12**	**500**	**150**	**50**	**50**	**750**

Th: Theory   Tw: Term Work   Pr: Practical   Or: Oral

310241 : Database Management Systems

Teaching scheme: Examination Scheme:
Lectures : 3 Hrs/Week Theory : 100 Marks

Objectives :

- To learn and understand Database System and its components
- To learn and understand various Database Architectures and Applications

Prerequisites :

- Discrete Structures
- Data Structures and Files

Unit I (06 Hrs)
Introduction to DBMS :

Basic concepts, Advantages of a DBMS over file-processing systems, Data abstraction, Database Languages, Data Models and Data Independence,

Components of a DBMS and overall structure of a DBMS, Multi-User DBMS Architecture, System Catlogs.

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: Nulls, Entity, Referential Integrities, Enterprise Constraints, Views, Schema diagram

Unit II (06 Hrs)
Relational Query Languages :

Relational Algebra and Relational Calculus: Tuple Relational and Domain Relational Calculus

Introduction to SQL : Characteristics and advantages, SQL Data Types and Literals, DDL, DML, SQL Operators, Tables: Creating, Modifying, Deleting, Views: Creating, Dropping, Updation 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 and Triggers, Introduction to QBE and QUEL Programmatic SQL: Embedded SQL, Dynamic SQL, ODBC

Unit III (06 Hrs)
Database Analysis and Design Techniques :

Information Systems Lifecycle, Application Lifecycle, Planning, System Definition, Requirement Analysis, Design, DBMS Selection, Application Design: Transaction and User-Interface Design, Prototyping, Implementation, Data Conversion and Loading, Testing, Data and Database Administration, Fact-Finding Techniques.

Relational Database Design : Purpose of Normalization, Data Redundancy and Update Anomalies, Functional Dependencies, The Process of Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF and DKNF.

Unit IV (06 Hrs)
Storage and File Systems :

Secondary Storage, RAID, File Organization, 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 (06 Hrs)
Transaction Management :

Basic concept of a Transaction, Properties of Transactions, Database Architecture, 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 (06 Hrs)
Object-Oriented Databases :

Need of OODBMS, Storing Objects in Relational Database, Introduction to OO Data Models, Persistent Programming Languages, Pointer Swizzling Techniques, Persistence, Object Management Group, Object Database Standard ODMG.

Database Architectures : Centralized and Client-Server Architectures, Introduction to Distributed Database systems.

Text Books :

1. Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", 4th Edition, McGraw Hill Publishers, 2002, ISBN 0-07-120413-X

2. Connally T., Begg C., "Database Systems", 3rd Edition, Pearson Education, 2002, ISBN 81-7808-861-4

Reference Books

1. Rab P. Coronel C. "Database Systems Design, Implementation and Management", 5th Edition, Thomson Course Technology, 2002, ISBN 981-243-135-7.

2. Elmasri R., Navathe S., "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2003, ISBN 8129702282.

3. Date C., "An Introduction to Database Systems", 7th Edition, Pearson Education, 2002, ISBN 81 –7808 – 231- 4.

4. Ramkrishna R., Gehrke J., "Database Management Systems", 3rd Edition, McGraw-Hill, 2003, ISBN 0 – 07 – 123151 – X.

310242 : Data Communications

Teaching Scheme :   Examination Scheme:
Lectures : 3 Hrs/Week   Theory : 100 Marks

Objectives :
- To learn and understand fundamentals of data communications.
- To understand the conceptual and analytical differences between analog and digital communication.

Unit I   (06 Hrs)
Introduction :

Communication System, Modulation, Baseband and Carrier Communication, Amplitude modulation: DSBFC, DSBSC, SSB, QAM, Carrier Acquisition, Superheterodyne AM Receiver, Angle Modulation: Frequency modulation, phase modulation, Analysis of FM, Bandwidth Requirements, Equivalence between FM and PM Digital Continuous Wave Modulation: ASK, FSK and PSK and Modems.

Unit II   (06 Hrs)
Pulse Modulation :

Sampling theorem, Natural and Flat Top Sampling, PAM, Pulse Time Modulation, Pulse Transmission over Band Limited Channel, Effect of Gaussian Type Noise on Digital Transmission, Crosstalk, Eye Diagram Line Codes : Bipolar, Unipolar, RZ, NRZ, Manchester, AMI

Unit III   (06 Hrs)
Pulse Code Modulation :

Encoder and Decoder, PCM – TDM, T1 Carrier System, Quantization Noise, Companding, DPCM, ADPCM, Delta modulation, Slope overload and Adaptive Delta Modulation, Scrambling, Digital Carrier Systems, Digital Multiplexing

Unit IV   (06 Hrs)
Information and Coding :

Measure of information, entropy, 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.

Unit V   (06 Hrs)
Digital Communications Technologies :

SF, ESF Framing, DS1/T1, B8ZS, DSU, CSU, HDSL, Digital Hierarchy, Digital Services, ISDN, Frame Relay, SONET, ATM, BISDN, SMDs, Video on Demand, ADSL Cellular Telephone Systems: Spread Spectrum Systems, DS/SS, FH/SS, Cellular Telephony, GPS, Transmission Media, PSTN.

Unit VI   (06 Hrs)
Computer Network :

Need and Applications of Network, Network Architecture, Protocols and Standards, OSI Model, TCP/IP Model, Network topology (Physical & logical), Types of Networks: Peer to Peer, Client-Server, LAN: Ethernet, Token Ring, FDDI, MAN: DQDB, SMDS, WAN: Architecture, Transmission Mechanism, Addressing, ISDN and Broadband ISDN.

Transmission Media : Guided Media – Twisted Pair, Coaxial and Fiber-optic cables, Unguided Media (Wireless): Radio and Micro Waves, Infrared.

Switching Techniques: Circuit switching, Packet switching and message switching, Telephone network, High-Speed Digital Access: DSL, Cable Modems and Sonets.

Text Books :

1. Stallings W., "Data and Computer Communications", 6th Edition, Prentice Hall of India Pvt. Ltd., 2002, ISBN 81-203-2067-0
2. Lathi B. "Modern Digital and Analog Communication Systems", 3rd Edition, Oxford University Press, 2003, ISBN 0 – 19 – 511009 – 9

Reference Books

1. Shanmugam K., "Digital and Analog Communication Systems", John Wiley & Sons (Asia) Pvt. Ltd. ISBN 9971 – 51 – 146 – 0.
2. Fourauzan B., "Data Communications and Networking", 3rd edition, Tata McGraw- Hill Publications, 2004, ISBN 0 – 07 – 058408 – 7.
3. Godbole A., "Data Communications and Networks", Tata McGraw-Hill Publications, 2002, 0 – 07 – 047297 – 1.
4. Gupta P., "Data Communications", PHI, 2004, ISBN 81 – 203 – 1118 – 3.
5. Shay W., "Understanding Data Communications and Networks", Third Edition, Brooks Kale Thomson Learning/ Vikas Publishing House, ISBN 981-254-966-8.
6. Garcia L., Widjaja I., "Communication Networks - Fundamental Concepts and Key Architectures" 2nd edition, Tata McGraw-Hill, 2000, ISBN 0 – 07 – 040235 – 3.

310243 : Microprocessors And Microcontrollers

Teaching scheme :   Examination scheme :
Lectures : 3 Hrs/week   Theory : 100 Marks

Objectives :
- To study architecture of Intel Pentium processor and it's programming.
- To study Intel super-scalar architecture.
- To study architecture and programming 8051 and PIC micro-controllers.

Prerequisite :
- Microprocessors and Interfacing techniques (210249).

Unit I   (6 Hrs)
Introduction to Pentium microprocessor :
Historical evolution of 80286, 386 and 486 processors, Pentium Features and Architecture, Pin Description, Functional Description, Pentium Real mode, Pentium RISC features, Pentium super-scalar Architecture-Pipelining, Instruction paring rules, Branch Prediction, Instruction and Data caches, The Floating-point unit.

Unit II   (6 Hrs)
Bus Cycles and Memory Organization :
Initialization and configuration, Bus operations-Reset, Non pipelined and pipelined (read and write), Memory organization and I/O organization, Data transfer mechanism –8 bit, 16 bit, 32 bit Data bus interface.

Pentium programming : Programmers's Model, Register set, Addressing modes, Instruction set, Data types, Data transfer Instructions, String Instructions, Arthmetic Insructions, Logical Instructions, Bit manipulation Instructions, Program Transfer instructions, and Processor Control Instructions.

Unit III (6 Hrs)
Protected Mode :

Introduction, segmentation – support registers, related instructions descriptions, memory management through segmentation, logical to linear address translation, protection by segmentation, Privilege level–protection, related instructions, inter-privilege level transfer of control, Paging– support registers, descriptors, linear to physical address translation, TLB, page level protection, virtual memory.

Unit IV (6 Hrs)
Multitasking, Interrupts, Exceptions and I/O :

Multitasking – Support registes, related descriptors, Task switching, I/O permission bit map.

Virtual Mode – Features, address generation, privilege level, instructions and registers available, entering and leaving V86 mode.

Interrupt structure – Real, protected and Virtual 8086 modes, I/O handling in Pentium, Comparison of all three modes.

Unit V (7 Hrs)
8051 Micro-controller :

Micro-controller MCS-51 family architecture, On-Chip data memory and program memory organization – Register set, Register bank, SFRs, External data memory and program memory, Interrupts structure, Timers and their programming, Serial port and programming, Other features, Design of minimum system using 8051 micro-controller for various applications.

Unit VI (6 Hrs)
PIC Micro-controller :

Overview and features of PIC 16C, PIC 16F8XX, PIN diagram, capture mode, compare mode, PWM mode, Block diagram, Programmer's model PIC, Reset and clocking.

Memory organization – Program memory, data memory, Flash, EEPROM, PIC 16F8XX addressing modes, Instruction set, programming, I/O ports, interrupts, Timers, ADC.

Text Books :

1. Antonakos J., "The Pentium Microprocessor", Pearson Eduction, 2004, ISBN – 81–7808–545–3.

2. Deshmukh A., "Microcontrollers – Theory and Applications", Tata McGraw-Hill, 2004, ISBN 0–07–058595–4.

Reference Books

1. Mazidi M., Gillispie J., "The 8051 Microcontroller and embedded systems", Pearson education, 2002, ISBN– 81–7808–574–7.

2. Ayala K., "The 8051 Microcontroller", Penram International, 1996, ISBN 81–900828–4–1.

3. Intel 8 bit Microcontroller manual.

4. Microchip manual for PIC 16CXX and 16FXX.

310244 : Digital Signal Processing

Teaching Scheme

Lectures: 4 Hrs/Week

Examination Scheme

Theory : 100 Marks

Objectives :

- To learn methodology to analyze signals and systems
- To get acquainted with the DSP Processors

Prerequisite :

- Knowledge of basic Engineering Mathematics

Unit I   (08 Hrs)

Classification of Signals :

Analog, Discrete-time and Digital, Basic sequences and sequence operations, Discrete-time systems, Properties of D. T. Systems and Classification, Linear Time Invariant Systems, impulse response, linear convolution and its properties, properties of LTI systems: stability, causality, parallel and cascade connection, Linear constant coefficient difference equations, Eigen functions for LTI systems and frequency response, Periodic Sampling, Sampling Theorem, Frequency Domain representation of sampling, reconstruction of a band limited Signal, A to D conversion Process: Sampling, quantization and encoding.

Unit II   (08 Hrs)

Representation of Sequences by Fourier Transform, Symmetry properties of F.T., F. T. theorems: Linearity, time shifting, frequency shifting, time reversal, differentiation, Parseval's theorem, convolution theorem, windowing theorem, Z-transform, ROC and its properties, Inverse z transform by inspection, partial fraction, power series expansion and complex inversion, Z transform properties: Linearity, time shifting, multiplication by exponential sequence, differentiation, conjugation, time reversal, convolution, initial value theorem, Unilateral Z-transform: solution of difference equation.

Unit III   (08 Hrs)

Frequency Response of LTI Systems :

Ideal frequency selective filters, magnitude and phase response, group delay, System Functions for LTI Systems: Stability and causality, inverse systems, significance of poles/zeros, Frequency Response for Rational System Functions : Frequency Response of a single zero or pole, Frequency response from pole-zero plot using simple geometric construction, systems with Linear phase, Generalized Linear phase systems, Four Types of GLPS.

Unit IV   (08 Hrs)

Sampling the F.T., Fourier representation of finite-duration sequences :

The Discrete Fourier Transform, Properties of DFT: Linearity, circular shift, duality, symmetry, Circular Convolution, Linear Convolution using DFT, Effective computation of DFT and FFT, Goerzel Algorithm, DIT FFT, DIF FFT, Inverse DFT using FFT, Practical considerations in FFT implementation.

Unit V   (08 Hrs)

Concept of filtering, Ideal filters and approximations, specifications, IIR filter design from continuous time filters: Characteristics of Butterworth, Cheybyshev and elliptic approximations, impulse invariant and bilinear transformation techniques, Design examples, FIR filter design using windows: properties of commonly used windows, incorporation of Generalized Linear Phase, Design Examples, Design using Kaiser window, Comparison of IIR and FIR Filters.

Unit VI (08 Hrs)

Block diagrams and Signal flow graph representation of LCCDE, Basic structures for IIR Systems: direct form, cascade form, parallel form, feedback in IIR systems, Transposed Forms, Basic Structures for FIR Systems: direct form, cascade form, structures for linear phase FIR Systems, Finite Register Length effect, DSP, Processors Architecture and Applications of DSP: Detail Study of DSP chip architecture as an example of ADSP 21XX series of microprocessor and their desirable features, Instruction set of ADSP 21XX series processor and some examples.

Text Books :

1. Oppenheim A., Schafer R., Buck J., "Discrete time signal processing", 2nd Edition, Prentice Hall, 2003, ISBN-81-7808-244-6

2. Proakis J., Manolakis D., "Digital signal processing", 3rd Edition, Prentice Hall, ISBN 81-203-0720-8

Reference Books

1. Babu R., "Digital Signal Processing", 2nd Edition, Scitech Publications, ISBN 81-873- 2852-5.

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. Manual - ADSP 21 XX family DSP.

5. White S., "Digital Signal Processing", Thomson Learning, ISBN –981-240-620-4.

310245 : Theory of Computation

Teaching Scheme	Examination Scheme
Lectures: 3 Hrs/Week	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 (6 Hrs)

Automata Theory :

Introduction to Finite Automata, Structural Representations, Automata and Complexity, Central Concepts to Automata Theory: Alphabets, Strings, Languages and Problems, 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 $\in$-transitions: Use of $\in$-transitions, NFA with $\in$,$\in$-closures, Extended transitions and languages for $\in$-NFA, Eliminating $\in$-transitions-Conversion of NFA with $\in$ to NFA without $\in$, Conversion of NFA without $\in$ to DFA, Conversion of NFA with $\in$ to DFA (direct method), FA with output: Moore and Mealy machines - Definition, models, inter-conversion.

Unit II (6 Hrs)
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 $\in$-NFA & $\in$-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.

Unit III (6 Hrs)
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, Eliminating unit productions, useless production, useless symbols, and $\in$-productions, Regular Grammar - definition, left linear and right linear, Regular Grammar, Regular Grammar and Finite Automata, FA to RG and RG to FA, Interconversion between left linear and right linear regular grammar.

Unit IV (6 Hrs)
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), 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.

Unit V (6 Hrs)
Turing Machine :

Problems that computers 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, Introduction to Post Machines, Comparison between FA, PDA, Post Machine and TM.

Unit VI (6 Hrs)
Introduction to Computational Complexity :

Un-decidability: A Language that is not recursively enumerable, An un-decidable problem that is RE, Post Correspondence Problem, Intractable Problems: The classes P and NP, Problems solvable in polynomial time, Nondeterministic Polynomial time, Polynomial time reduction and NP-complete problems.

Text Books :

1. Hopcroft J., Motwani R., Ullman J., "Introduction to Automata Theory, Languages and Computations", Second edition, Pearson Education Asia, ISBN 81-7808-347-7.

2. Martin J., "Introduction to Language and Theory of Computation", Third edition, Tata McGraw-Hill, ISBN 0-07-049939-X.

Reference Books

1. Lewis H., Papadimitriou C., "Elements of Theory of Computation", Second edition, Pearson Education Asia, ISBN 81-7808-487-2

2. Cohen D., "Introduction to Computer Theory", Wiley Publications, edition, ISBN- 9971-51-220-3

3. Moret B., " The Theory of Computation", Pearson Education Asia, ISBN 81-7808-487-2.

4. Mishra K., Chandrasekaran N., "Theory of Computer Science (Automata, Languagesnand Computation)", Second Edition, Prentice Hall of India, ISBN-81-2030-1271-6.

310246 : RDBMS AND Visual Programming Laboratory

Teaching Scheme:	Examination Scheme:
Theory: 2 Hrs/Week	Term Work: 50 Marks
Practical: 4 Hrs/Week	Practical: 50 Marks

Objectives :

- To learn and understand SQL, PL/SQL, Dynamic SQL and Embedded SQL.
- To learn and understand Visual programming paradigms.

Instructor should conduct classroom lectures and demonstrations to cover following topics.

RDBMS

- Demonstration of a relational database management software likeACCESS/ORACLE/MYSQL/PostgreSQL/SQLSERVER/INGRESS and discussion of features such as

- Table Definition, Relationships, Referential Integrity, Enterprise Constraint.
- SQL support.
- Forms and report generation facilities.
- Import/export commands and Macros.

PL/SQL

- Basics of PL/SQL, Declarations and Blocks, Expressions
- Functions, if statement and loops, built-in functions
- Database modifications, Cursors, Triggers
- Subprograms, Stored Procedures, Functions and Packages

COBOL

- Introduction to COBOL Programming
- Tables
- File Handling

Visual Programming

- Concept of event-driven programming
- Program development life cycle using VB
- VB Integrated Development environment, Options
- Introduction to VB Forms, Controls, properties, events, Menus
- Introduction to VB Programming, Built-in Functions: Date, String, Financial etc, Program Debugging
- Popup Menus, Toolbars, CoolBars, StatusBars, MaskEdit, ImageCombo, Disk Files, Resource Files, Shell, AppActivate, SendKeys Functions
- Database Access using VB (Data Control, ADO, DAO, OLEDB, ODBC)
- VB Wizards : Application Wizard, Data Form Wizard

Suggested list of Assignments

Part I : RDBMS

1. Write a 'C' program to design and develop a mini database system that should allow a user to create database tables, insert records in the tables and write and execute simple SQL like queries (involving only select and from clauses) to retrieve data from the database. The program should implement data dictionary and store data in tables using file system of the underlying operating system.

2. Design and draw an ER/EER diagram using standard notations for given problem definition and convert this diagram into Database Tables. (Instructor should define problem definition with reasonable complexity for each batch such that it facilitates the use of all ER/EER features such as all types of relationships, all types of attributes, strong and weak entities, aggregation, generalization etc.) Create Database Tables and Indices in back-end database such as ACCESS/Foxpro etc using GUI/Commands. Insert tuples in each table such that every relationship and constraint is reflected. Perform updates on these tables. Now create tables with ORACLE/INGRESS/SQL Server/MySQL/PostgreSQL using SQL DDL statements. Use SQL DML statements such as INSERT, UPDATE and DELETE to insert the data into tables and to update/delete the data inserted into/from tables. Write and execute SQL queries to extract information from the tables. (Instructor should frame questions such that the required queries should involve use of string manipulation functions, aggregate functions, Date functions, conversion and transformation functions, simple queries and nested queries, renaming of attributes and/or tables, removal of duplications, creating views etc.)

3. Design and develop forms and reports using MS ACCESS or ORACLE D2K.

4. Write and execute 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 back end Databases).

5. Write and execute Dynamic SQL query. (Instructor should frame appropriate problemdefinition).

6. Write and execute Triggers and Procedures/ Functions using PL/ SQL. (Instructor should frame appropriate problem definition).

7. Create and perform Database operations using ODBC

8. At least two assignments on COBOL to cover the concepts of file handling and Table handling. *(COBOL assignments should be assessed internally for Term Work only).*

Part II : Visual Programming :

Write and execute **6-7** assignments in VB to illustrate the use of various features of Visual Basic such as

- **User Interface Design**

  Controls and components (Text Boxes, Labels, Option and Command buttons, Check boxes, List boxes and Combo boxes, Shapes, Panels, Menus, Frames, Rich Text boxes, Scroll bars, Grid control, control arrays, Image and Picture boxes, Message boxes, Progress bar, Numeric Up-Down counter, Tab controls, Common Dialog Box etc.)

  Properties - Use of important properties (Appearance, Behavior etc) for every control on the form

- **VB Programming** (Data types, variable declarations, control structures, file support)

- **Events** (Click, double click, change, Form Load, Got Focus, Lost Focus, Key pressed etc)

- **Database Programming Using:** VB Data Control, ADO, DAO and OLEDB

- **Overall program development life cycle** (Form design, Control and events, Application, Data Form and Packaging and Deployment Wizards).

  Instructor should frame appropriate problem definitions for these assignments.

Mini Project

Instructor should assign a mini project to a group of 3 – 4 students based on RDBMS and/or Visual programming. Application should consist of 3 – 4 tables, relevant forms and reports. VB Controls such as Toolbar, CoolBar, StatusBar, ImageCombo, Mask Edit, Menus and Popup Menus, Grid, Chart controls, TreeView, Listview, MonthView, DateTimePicker, Resource File etc may be used to build the Mini Project. Students should submit :

(i) Design of the Database (use ER/EER diagrams, schema diagrams and Normalization techniques)

(ii) Create necessary tables

(iii) Details of form design, controls their properties and event description

(iv) Provide Insert, Delete, Update and record navigation facilities with suitable User Interface using VB and its data aware controls. Provide facilities to generate necessary reports

(v) Setup Program for a project using packaging and deployment wizard

Instructor should assess the mini-project and assign marks for the term work.
Instructions :

- Instructor should frame assignments based on the assignments as given above. Students should submit Term Work in the form of a journal that should include at least 14 assignments (with minimum of 7 assignments based on RDBMS and Visual Programming each with at least 2 assignments based on COBOL) and a mini-project. Each assignment should consist of paper design (Database and/or user interface), writeup, program listing with proper documentation and printout of the output.

- Practical Examination will be based on the term work (except COBOL assignments) and questions will be asked to judge understanding of assignments performed at the time of examination.

Reference Books

1. Luers T., Atwood T., Gennick J., "Teach Yourself SQL in 21 Days", Techmedia, ISBN 81 – 7635 – 014 – 1

2. Rob P., Semaan E., "Databases: Design, Development and Deployment Using MSACCESS", 2001, Tata McGraw-Hill, ISBN 0 – 07 – 044534 – 6

3. Urman S., Hardman R., McLAUGHLIN M., "PL/SQL Programming: Develop Database Driven PL/SQL Applications", Tata McGraw-Hill Edition, 2004, ISBN 0 –07 – 059779 – 0

4. Reese G., Yarger R., King T., Williams H., "Managing and Using MySQL", 2nd Edition, Shroff Publishers and Distributors Pvt. Ltd., ISBN 81 – 7366 – 465 – X.

5. Norton P., Groh M., "Guide to Visual Basis 6", 1st Edition, Techmedia Publication, 1998, ISBN 81-7635-145-8.

6. Stern N., Stern R., "Structured COBOL Programming", 7th Edition, John Wiley & Sons, ISBN 9971 – 51 – 150 – 9.

7. Sunderraman R., "Oracle 9i programming – a Primer", Pearson Education, ISBN 81-297-0362-9.

8. Rosenzweig B., Silvestrova E., "Oracle PL/SQL by Example", 3rd Edition, PearsonEducation ISBN 81-297-0503-6.

310247 : Signal Processing Laboratory

Teaching Scheme	Examination Scheme
Practical: 4 Hrs/week	Term Work: 25 Marks
	Oral : 50 Marks

Suggested List of Assignments

1. Write a C program to generate samples of sine, square, exponential and random signals at specified sampling frequency and signal parameters.

2. Find the output of a given system for given input sequence using linear convolution.

3. Find the output of a system described by given difference equation and initial conditions for given input sequence.

4. Write a program to accept pole zero locations to generate

a. Pole zero plot

b. All possible ROCs

5. Write a C program to plot the magnitude and phase response of a given system. Also find the magnitude and phase at a particular frequency.

6. Find the N point DFT / IDFT of the given complex sequence x (n) / x (k)

7. Find the N point circular convolution or linear convolution using circular convolution of given two sequences.

8. Compute the linear / circular convolution of given two sequences using DFT and IDFT.

9. Implement the N-point radix-2 DIT FFT algorithm to find DFT or IDFT of given sequence x (n) or X (k).

10. Find DFT of a given sequence using Goertzel algorithm.

11. Find the Fourier transform of various window functions. Plot the magnitude and phase functions.

12. Design a DT IIR Butterworth filter for given specifications using Bilinear Transformation.

13. Design an FIR filter from given specifications using windowing method.

Note :

- Assignments should be developed in C/C++. Compare the output(s) of your programs with the output of any software package related to signal processing like Sigview/Octave/Matlab etc

- In Addition to these assignments, at least two assignments from 1 to 13 should be carried out using DSP - Processor kit

- Students will submit Term Work in the form of a Journal, which will include at least 12 assignments.

- Each assignment should include algorithm analysis and program listing.

- Oral Examination will be based on the Term Work

Text Books :

1. Ingale V., Proakis J., "Digital Signal Processing using MATLAB International Student Edition", Thomson Cole, ISBN 981-240-215-2.

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", Thomson Brooks/Course (Vikas Publishing House), 2001, ISBN 981-240-230-6.

Reference Books

1. Manuals – Matlab

2. Manuals – ADSP 21XX family DSP.

310248 : Hardware Laboratory

Teaching Scheme:
Practical: 4 Hrs/Week

Examination Scheme:
Term work : 25 marks
Practical : 50 marks

Suggested List of Assignments

1. File I/O: Write Assembly Language Program (ALP) using Program Segment Prefix (PSP) to provide following file handling utility functions :

   a. Create file

   b. Read file

   c. Display file in dump and text mode

   d. Modify a file

   e. Delete a file + rename a file

2. Write an ALP to carry out complex arithmetic operations using coprocessor

3. Disk I/O: Write inline code (Interfacing 'C' with assembly language) for the following

   a. Boot sector display for 1.44MB Floppy disk

   b. Display file contents using Root directory and FAT

4. Write an Installable DOS Device Driver for a printer. Study of Windows Device Drivers

5. Study Assignments

   a. Study and troubleshooting of Mother board, memory, video, adaptors, Keyboard, FDD, HDD, serial, parallel ports etc.

   b. Study of PC diagnostic tools

   c. Study of PC Add-on card

6. PC Assembly, setup and Installation : Assemble the PC and carry out CMOS and other setting, Partition the hard disk, install dual operating systems say Windows and Linux, install necessary drivers for peripherals such as printer, modem, scanner, zip drive, pen drive, CDROM, LAN Card, Camera etc. and Configure the system for intranet and Internet access.

7. PC-to-PC communication using NULL MODEM connection (using 'C' language only)

8. Write an ALP to understand working of a Mouse. The program first tries to determine if a mouse driver is present. If so, it will show Mouse's X and Y Positions that will be updated as per the mouse movement. The Program will make the speaker beep whenever mouse gets near the center of the screen. The program will display a target say a [*] on the screen and will terminate whenever, the mouse button is pushed while the cursor is over *. The program will also terminate if the user enters the key 'Q'. The program will hide or show the mouse if the user presses 'H' and 'S' keys respectively.

9. Write assembly language program to perform detection of DOS Protected Mode Interface (DPMI), make CPU Identification, Capture Machine Status Word and Display the contents of Task Register, GDTR, IDTR and LDTR.

10. Simulation of Cache Memory algorithms using "SMP Cache".

11. Assignments based on Programming 8051 Micro-controller using 8051 hardware or kits to cover following topics :

    a. Bit addressable area, Register Banks, External data memory, External program, Memory (MOVX, MOVC etc)

    b. Timer programming : ISR based

    c. Serial port programming: ISR based

12. PIC 16FXX programming (using simulator only)

    a. I/O ports-programming

    b. ADC programming

Note : Assembly Language Programming to be written using MASM or NASM

Instructions :

- Instructor will frame assignments based on the assignments as given above. Students will submit Term Work in the form of a journal that will include <u>at least 15</u> assignments (with at least five assignments based on Micro-controllers).

- Practical Examination will be based on the term work and questions will be asked to judge understanding of assignments performed at the time of examination.

Reference Books

1. Rayduncon, "Advance MSDOS Programming", BPB Publication, ISBN 81-7029-485-1

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2. Muller S., "Upgrading and Repairing your PC", 10th Edition, 2002, PHI, ISBN 81-203-1635-X

3. Predko M., "Programming and customizing the 8051 Microcontroller", 2004, Tata McGraw-Hill, ISBN – 0-07-042140-4

4. Mathivanan N., "Microprocessors, PC Hardware and Interfacing", PHI, ISBN 81 – 203 – 2317 – 3.

310249 : Principles of Programming Languages

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/week	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   (6 Hrs)
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.

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.

Unit II (6 Hrs)
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.

Unit III (8 Hrs)
Procedural Programming :

Design Principles, Control flow: statement-oriented and blockoriented 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.

Unit IV (8 Hrs)
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 multithreads, Comparative study of C++ and Java.

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

Unit V (6 Hrs)
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.

Unit VI (8 Hrs)
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, Introduction to Concurrent Programming.

Text Books :

1. Roosta S., "Foundations of Programming Languages", Thomson Brookes/Cole, ISBN 981 – 243 – 141 – 1.

2. Sethi R., "Programming Languages concepts & constructs", 2nd Edition, Pearson Education, ISBN 81 – 7808 – 104 – 0.

Reference Books

1. Sebesta R., "Concepts Of Programming Languages", 4th Edition, Pearson Education, ISBN – 81-7808-161-X.

2. Ghezzi C., Milano P., Jazayeri M., "Programming Languages Concepts", 3rd Edition, John Wiley and Sons Pvt. Ltd (WSE), ISBN – 0195113063.

3. Balagurusamy E., "Programing with C#", Tata McGraw-Hill, 2002, ISBN 0 – 07 –047339 – 0.

4. Bhave M. Patekar S., "Programming in Turbo PASCAL", Tata-McGraw Hill, 0 – 07 –462100 – 9.

5. Eckel B., "Thinking in Java", 3rd Edition, Pearson Education, 81 – 297 – 0524 – 9.

6. Winston P., Klaus B., Horn P., "LISP", 3rd Edition, Pearson Education, 81 – 7808 –155 – 5.

310250 : Computer Networks

Teaching Scheme: Examination Scheme:
Lectures: 3 Hrs/Week   Theory : 100 Marks

Objectives :

- To learn and understand fundamentals of computer network.
- To learn and understand network architectures, protocols and applications.

Prerequisite :

- Data Communications

Unit I   (06 Hrs)
Introduction :

Review of Applications of Computer Networks, Network hardware and software, Reference Models: OSI and TCP/IP, Example Networks: Internet, X.25, Frame Relay, ATM, Ethernet, Wireless LANs, Network standardization, Switching, Buffering and Multicasting.

Unit II   (06 Hrs)
Data Link Layer :

Design issues: Services, Framing, Error and flow control, Stop-and-Wait protocol, Sliding Window protocol, Go-Back-N ARQ, Selective Repeat ARQ, HDLC, Data link layer in Internet and ATM.

Point-to-Point-Access (PPP) : Frame format, Transition states, PPP Stack: LCP, NCP

Network Hardware Components : Connectors, Transceivers and Media Converters, Repeaters, NICs, Bridges and Switches.

Unit III (06 Hrs)
Medium Access Control sub-layer :

Channel allocation: Static and Dynamic allocation, Multiple Access Protocols: ALOHA, CSMA, Collusion-free and limited-contention protocols, WDMA, Wireless LAN Protocols, Ethernet: Cabling, encoding, MAC sub-layer protocol, Switched, fast and Gigabit Ethernet, Logical link control, Wireless LANs and Digital Cellular Radio, Broadband Wireless, Virtual LANs, Bluetooth, Virtual Circuit Switching: Frame Relay and ATM.

Unit IV (06 Hrs)
Network Layer :

Design Issues, Packet switching, Connectionless and Connection-oriented Services, Virtual Circuit and Datagram Subnets, Routing Algorithms, Internetworking, Firewalls

Congestion Control and QOS : General Principals, Congestion prevention policies, Load shading, Jitter Control, Quality of Service, Internetworking.

Network layer Protocols : ARP, IP protocol, IP Addresses, IPV6, ICMP, Unicast Routing Algorithms : RIP, OSPF, BGP, Multicast Routing : IGMP, Mobile IP

Unit V (06 Hrs)
Transport Layer :

Services and service primitives, Sockets and Socket programming, Elements of Transport protocol: Addressing, Connection establishment and release, flow control and buffering, Multiplexing, Crash recovery, Simple Transport Protocol, UDP : Introduction, RPC, TCP: Introduction, Model, protocol, header, connection establishment and release, connection management, Transmission policy, congestion control, timer management, Introduction to wireless TCP and UDP, Performance issues.

Unit VI (06 Hrs)
Application Layer :

Domain Name System (DNS) and DNS servers, Electronic Mail : Architecture and services, Message Formats, MIME, message transfer, SMTP, Mail Gateways, Relays, Configuring Mail Servers, File Transfer Protocol, General Model, commands, TFTP

World Wide Web : Introduction, Architectural overview, static and dynamic web pages, WWW pages and Browsing, HTTP, LDAP, Browser Architecture, Caching in Web Browser remote login, Wireless Web.

Text Books :
1. Tanenbaum A., "Computer Networks", 4th Edition, PHI, ISBN 81 – 203 – 2175 – 8.
2. Fourauzan B., "Data Communications and Networking", 3rd edition, Tata McGraw-Hill Publications, 2004, ISBN 0 – 07 – 058408 – 7.

Reference Books
1. Keshav S., "An Engineering Approach to Computer Networking", Perason Education, ISBN 981 – 235 – 986 – 9
2. Comer D., "Computer Networks and Internet", 2nd Edition, Pearson Education, ISBN 81 – 7808 – 086 – 9
3. Gallo M., Hancock W., "Computer Communications and Networking Technologies",Thomson Brooks/Cole, ISBN 981 – 240 – 354 – X.

310251 : Management Information Systems

Teaching scheme: Examination Scheme:
Lecturers: 3 Hrs/Week   Theory : 100 Marks

Objectives :

- To learn and understand fundamentals of Information Systems.
- To learn and understand architecture, methodology and applications of MIS.

Unit I   (06 Hrs)

Foundations of Information Systems and Management :

Why Information systems?

Components and resources of information systems, Information system activities, Types of information systems: Operations support systems and Management support systems

Management Information Systems : Definition, role and impact of MIS, Introduction to Management, Approaches to Management, Functions of the managers: Management effectiveness, planning, organizing, staffing, coordinating and directing, MIS as a support to the management and a tool for management Process, Organization structure and theory : Organization structure, behavior, organization as a system, MIS : Organization.

Strategic Management of Business : Concept of Corporate Planning, Essentiality of strategic planning, development of business strategies, types of strategies, MIS for Business Planning.

Infrastructure management : Selection, maintenance of hardware, communication equipments and software as per MIS needs of the organization. Ensure uptime of hardware resources, database management and end user training.

Unit II   (06 Hrs)

Applications of MIS

Manufacturing Sector : Introduction, Personal Management, Marketing Management, Accounting and Finance Management, Production Management, Materials Management and Marketing Management, MIS Applications in Banking and Insurance Sector.

Service Sector : Introduction, MIS applications in service industry.

Cross-Functional Enterprise Systems : Introduction, Collaboration systems in Manufacturing, Enterprise application Integration, Transaction Processing systems.

Implementation Challenges : Integration, implementing IT, End user Resistance and Involvement, Change Management.

Unit III   (06 Hrs)

Enterprise Management Systems(EMS) :

Introduction, Enterprise Resource Planning (ERP) systems: Basic features, benefits, selection, implementation, EMS and MIS.

Business Process Re-engineering (BPR) : Introduction, Business process, Process and Value stream model of the organization, MIS and BPR.

Business Process Outsourcing (BPO) : What is BPO? Voice BPO i.e. Call center, non-voice BPO, Scope of BPO, challenges in BPO management

Unit IV (06 Hrs)

Customer Relationship Management(CRM) :

Introduction, What is CRM? Three phases of CRM, Benefits, challenges and trends in CRM

Supply Chain Management(SCM) : What is SCM? Role of SCM, Benefits, challenges and trends in SCM

Electronic Commerce Systems(eCommerce) : Introduction, scope, B2C, B2B and C2C, Essential e-Commerce processes, Electronic Payment Processes, e-Commerce Applications.

Unit V (06 Hrs)

Decision Support Systems (DSS) :

Concept and philosophy, Using Decision Support systems: What-if analysis, sensitivity analysis, Goal-seeking analysis, Optimization analysis, Introduction to Data Warehouse: Architecture, Organization and Management of Data Warehouse, Implementation, Data Mining for Decision support, Executive Information systems, Enterprise Information portal and knowledge management systems, Introduction to Artificial Intelligent Systems, Knowledge Based Expert systems, GIS.

Unit VI (06 Hrs)

Security and Ethical Challenges :

Introduction, Ethical responsibility of Business Professionals, Computer Crime, Hacking, Cyber Theft, Software Piracy, Privacy issues, Health issues.

Security Management: Introduction, Tools, Encryption, Firewalls, e-Mail monitoring, biometric security, disaster recovery, fault-tolerant systems, system controls and audits, Contingency management and solutions.

Global Management of Information Technology: Cultural, political and Geo-economic challenges, global business/it strategies, applications, platforms and Data access issues.

Text Books :

1. O'Brien J., "Management Information Systems: Managing Information Technology in the Business Enterprise", 6th Edition, Tata McGraw-Hill Publishing Company Limited, 2004, ISBN 0 – 07 – 058739 – 6

2. Jawadekar W., "Management Information Systems", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, 2002, ISBN 0 – 07 – 044575 – 3

Reference Books

1. Post G., Anderson D., "Management Information Systems", 3rd Edition, Tata McGraw-Hill Publications, ISBN 0 – 07 – 049940 – 3.

2. Gupta U., "Management Information Systems : A Managerial Perspective", Galgotia, ISBN 81 – 7515 – 085 – 8.

310252 : Systems Programming

Teaching Scheme
Lectures: 3 Hrs/Week

Examination Scheme
Theory : 100 Marks

Objectives :

- To understand the concepts and components of Systems Programming.
- To Learn and understand the fundamentals of Compilers.
- To Learn and understand the fundamentals of Operating systems.

Prerequisites :

- Data Structures
- Computer Organization

Unit I   (6 Hrs)
Introduction :

Components of System Software, Language Processing Activities, Fundamentals of Language Processing, Development tools.

Assemblers : Structure of an assembler, Design of Two pass assembler, Single Pass Assembler, Cross Assembler.

Macro Processors : Macro Definition and call, Macro expansion, Nested Macro Calls, Advanced Macro Facilities, Design of a macro-processor, Case study of MASM.

Unit II   (6 Hrs)
Linkers and Loaders :

Loader Schemes: Compile and go, General Loader Scheme, Absolute loaders, subroutine linkages, relocating loaders, direct linking loader, dynamic linking loader, overlay structure, Design of an Absolute loader, Case study of MS-DOS Linker and Debug.

Dynamic Linking : Dynamic Link Libraries-their need, conventional dynamic linking libraries, the class library, dynamic linking, DLL's, use of call back functions, Dynamic linking with and without import.

Unit III   (6 Hrs)
Compilers and Interpreters :

Overview of Compilation process, Concepts of Pass, Phases, front-end and back-end, Concepts of Bootstrap compiler, cross compiler, incremental compiler and compiler-compiler (Only definitions), Interpreters, comparison of Compilers and Interpreters.

Lexical Analysis and Parsing : Why and what is lexical analysis, design issues, Introduction to parsing, concept of top-down recursive-descendent parsers.

Unit IV   (6 Hrs)
Operating Systems :

Introduction, Evolution of OS, Functions of an OS, Batch Processing Systems, Multi-programming Systems, Time sharing systems, Multitasking systems, Real Time Operating Systems, OS Structure, System Calls, Process, Process Control and Process Scheduling (Job Scheduling, scheduling criteria, scheduling algorithms).

Unit V (6 Hrs)
Memory management :

Contiguous and non-contiguous, Swapping, Paging, Segmentation and demand Paging, Virtual Memory, Management of Virtual memory: allocation, fetch and replacement .

Unit VI (6 Hrs)
I/O Management :

I/O programming, I/O organization, I/O scheduling algorithms, I/O buffering.

File Management : Concept, Access methods, Directory Structure, Protection, File System implementation, Directory Implementation, Allocation methods, Free Space management, efficiency and performance.

Text books :

1. Dhamdhere D., "Systems Programming and Operating Systems", 2nd Edition, Tata McGraw Hill, 1999, ISBN 0 – 07 – 463579 – 4.
2. Silberschatz, Galvin, Gagne, "Operating System Concepts", 6th Edition, John Wiley and Sons, ISBN 9812 – 53 – 055 – X.

Reference Books

1. Stallings W., "Operating Systems", 4th Edition, Prentice Hall, 81 – 7808 – 503 – 8.
2. Beck L., "System Software: An Introduction to Systems Programming", 3rd Edition, Pearson Education, 1997, ISBN 0-201-43581-0.
3. Aho A., Sethi R., Ullman J., "Compilers", Pearson Education, 81 – 7808 – 046 – X.
4. Petzold C., "Programming Windows", 5th Edition, Microsoft Press, 81–7853– 007– 4.

310253 : Software Engineering

Teaching Scheme	:	Examination Scheme
Lectures: 3 Hrs/week		Theory : 100 Marks

Objectives :

- To learn and understand the Concepts of Software Engineering.
- To apply the principles of Software Engineering for software development.

Unit I (06 Hrs)
Introduction To Software Engineering :

Software, Software Myths, Process Framework, CMMI, Process Patterns, Process Assessment, Personal and Team Process Models, Process Models : Waterfall Model, Incremental Models, Evolutionary Models, Introduction to specialized Process Models, The Unified Process.

Unit II (06 Hrs)
Software Engineering Practice :

The Essence of Practice, Core Principles, Communication Practices, Planning Practices, Modeling Practices: Analysis and Design Modeling, Construction Practice: Coding and Testing Principals, Deployment.

System Engineering : Computer-Based Systems, Hierarchy: System Modeling and Simulation, Business Process Engineering, Product Engineering, System Modeling : Hatley-Pirbhai Modeling and Modeling using UML.

Unit III (06 Hrs)

Requirements Engineering :

Requirements Engineering Tasks, Initiating the process, Eliciting Requirements, Developing Use-Cases, Building The Analysis Model: Requirements Analysis, Data Modeling Concepts, Object-Oriented Analysis, Scenario-Based Analysis, Flow-Oriented Modeling, Class-Based Modeling, Creating a Behavioral Model.

Unit IV (06 Hrs)

Design Engineering :

Design Process and design quality, Design Concepts, The Design Model, Introduction to Pattern-Based Software Design.

Architectural Design : Software Architecture, Data Design and Architectural Design User Interface Design: Rules, User Interface Analysis and Steps in Interface Design, Design Evaluation.

Unit V (06 Hrs)

Testing Strategies And Tactics :

A Strategic approach to Software Testing, Strategic Issues, Testing Strategy for Conventional Software and Object-Oriented Software, Validation Testing, System Testing, Validation and Verification

Testing Tactics : Black Box and White Box Testing, Basis Path Testing, Control Structure Testing, Object-Oriented Software Testing Methods

Unit VI (06 Hrs)

Product Metrics :

Software Quality, Framework for Product Metrics, Metrics for Analysis Model, Design Model, Metrics for Source Code, Metrics for Testing and maintenance

Text Books :

1. Pressman R., "Software Engineering, A Practitioners Approach", 6th Edition, Tata McGraw Hill Publication, 2004, ISBN 007 – 124083 – 7.

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 Princilpes and Practices", Second Edition, John Wiley and Sons, ISBN 9971-51-357-9.

3. Ghezzi C., Jazayeri M., Mandrioli D., "Fundamentals of Software Engineering", Second Edition, Prentice Hall India, 2003, ISBN 81-203-2242-6.

4. Behfarooz A., Hudson F., "Software Engineering Fundamentals", Oxford University Press, 2002, ISBN 0-19-510539-7.

310254 : Software Laboratory

Teaching Scheme
Practical : 4 Hrs/Week

Examination Scheme
Term Work: 25 Marks
Practical : 50 Marks

Group A
JAVA (at least 5 assignments)

(1) Assignment(s) to understand object oriented features in Java such as classes, objects and methods Vectors, strings, Inheritance, access specifiers, Multiple Inheritance and Exception Handling.

(2) Write a simple Applet to illustrate event handling with interactive radio buttons to control font style of a text field. Also provide a text box wherein the user may enter font size.

(3) Multi-threading (Displaying an animated clock showing day, date and time using threads).

(4) Write a program to retrieve data from some database table(s) using JDBC.

(5) Write a simple Echo server using Sockets.

LISP (at least 2 assignments)

- Assignment based on LISP functions
- Line editor using LISP

Group B : (at least 6 assignments)

(1) Design suitable data structures and develop a subset of an assembler for 8 or 16 bit microprocessor. Subset should consist of a few instructions from each category and few assembler directives.

(2) Design suitable data structures and develop a subset of a macro assembler for 8 or 16 bit microprocessor. Facilities such as Nested Macro, Labels within Macro, Macro Parameters, Conditional Macro Expansion, Macro Operators (%, &, < ...> etc) to be supported. Use Turbo Librarian to build and use your library code modules.

(3) Write a program to demonstrate DOS Memory Management Mechanism.

(4) Write a Dynamic Link Library and Test it

(5) Design and Implement any simple application using Word/Excel Macros.

(6) Using Windows API, develop any simple application such as Getting and setting Windows Information, System Colors, Running a Program/File, Shutting down Windows.

Group C (At Least 3)

1. Write a program to demonstrate the creation and use of Custom attributes and other features of C#.

2. Write a program to demonstrate the use of delegates, callbacks, and synchronous and asynchronous method invocation.

3. Create a screen saver application using GDI+ in C#.

4. Write a program Using a File System Watcher Component in a Windows Form with C # Demonstrates how the File System Watcher Class monitors the file system and raises events whenever a specified Directory or file within a specified Directory changes.

Instructions :

- Instructor should frame assignments based on the assignments as given above. Students should submit Term Work in the form of a journal that should include at least 16 assignments. Each assignment should consist of paper design, write-up, algorithm, program listing with proper documentation and printout of the output.

- Practical Examination will be based on the assignments from Group A & B only and questions will be asked to judge understanding of assignments performed at the time of examination.

Reference Books

1. Eckel B., "Thinking in Java", 3rd Edition, Pearson Education, 81 – 297 – 0524 – 9

2. Winston P., Klaus B., Horn P., "LISP", 3rd Edition, Pearson Education, 81 – 7808 –155 –5.

3. Balagurusamy E., "Programing with C#", Tata McGraw-Hill, 2002, ISBN 0 – 07 –047339 –0.

4. Schneider D., "An Introduction to Programming Using Visual Basic 6.0", Prentice Hall, 1999, ISBN 0-13-936428-5.

5. Petzold C., "Programming Windows", 5th Edition, Microsoft Press, 81–7853– 007– 4.

310255 : Computer Networks Laboratory

Teaching Scheme:	Examination Scheme:
Theory : 2 Hr/Week	Term Work : 25 Marks
Practical : 4 Hrs./Week	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

- Active Server Pages (ASP) and 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, Novel Netware and Windows.

Suggested List of Assignments

1. Study of existing LAN and understand the design and various components. Set up a small network of 3 to 4 computers and Hub/Switch as directed by the instructor. Use Lan Card, UTP Cables and Connectors. Install LAN Cards and Crimp the connectors. Assign unique IP addresses and share C drive on each machine. Test the network by using PING command. Use protocol analyzer Software. Repeat the assignment by installing two LAN Cards in one of the machines. Repeat the same assignment by adding a router. Configure the router and use RIP.

2. Study any protocol analyzer software (eg. LanExplorer) to learn and use its important features, Study of network monitoring software like ETHREAL software. Assignment to examine TCP/IP and non-TCP/IP protocols (IPX/SPX) and capture them using protocol analyzer Software.

3. Assignment to learn and understand Windows 2003 server and its associated domain operations, to configure RAS and DHCP, to add users and computers to a domain.

4. Assignment to learn and understand Linux and/or Novel Netware Network configurations and commands.

5. Installation and configuration of IIS /PWS/Apache server. Study and use various facilities/commands and features.

6. Write a program in C/C++ to implement an ECHO server, using Socket programming with both TCP and UDP protocols.

7. Implement a "Quote of the Day" Server using VB and WinSock Control. Also develop a client application where the user will select TCP or UDP Option, Provide the name of the Server and the Port Number. When the user clicks a button "Get the Quote", the client will receive the quote from the server.

8. Write an "Internet Update" program using Internet Transfer Control provided in Visual Basic that will update the files on a local machine for which newer versions of these files are available on the server. Provide facility for the user to determine which files to be updated and which are not.

9. Develop a simple application to using MAPI and TAPI.

10. Design a HTML page for taking sales order of various items of some company. The page should display Company name with its logo. The buyer will provide his/her name, address, and desired quantity against each item shown along with unit price in a table and select desired payment mode by selecting appropriate option button labeled "Visa", "Master Card" etc. The form will also have two command buttons – "OK" and "Cancel" for the user to select.

11. Write a PHP Script that computes total cost of the ordered items from assignment 10, after adding sales tax. The script will show exactly what items have been ordered.

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.

13. Write an application that should read a SQL query from the user based on some database in say MySQL, call a PHP script to process the query and display the results.

14. Develop a simple Web based application. Use client-side and server-side scripting.

Mini Project

Students should work in a group to develop an Interactive Database-driven Web based application using ASP, VB and Backend Database and use Software Engineering Principals to develop the project and should deliver necessary documents such as SRS, Design details, User Interface, neatly documented code etc.

Instructions :

- Instructor should frame assignments based on the assignments list as given above. Students should submit Term Work in the form of a journal that should include at least 15 assignments and a mini project. Each assignment should consist of laboratory work such as design, write-up, algorithm, program listing with proper documentation and printout of the output if any.

- Oral Examination will be based on the term work and questions will be asked to judge understanding of assignments performed.

Reference Books

1. Musciano C., Kennedy B., "HTML and XHTML", Fifth Edition, O'Reilly / SPD Publication, ISBN 81-7366-514-1.

2. Mansfield K., Antonakos J., "An Introduction to Computer Networking", Perason Education, 2002, ISBN 81 – 7808 – 828 – 2.

3. McKinnon A., McKinnon L., "XML", Vikas Publishing House, 2004, ISBN 981 –254 – 299 – X.

4. Morrison M., Morrison J., "Database-Driven Web Sites", Thomson Learning (Vikas Publishing House), 2001, ISBN 981 – 240 – 216 – 0.

5. Sebesta R., "Programming in World Wide Web", Second Edition, Pearson Education, 2002, ISBN 81 – 297 – 0439 – 0.

310256 : Software Development Tools Laboratory

Teaching Scheme: Examination Scheme:
Practical: 2 Hrs / week   Term Work : 50 Marks

Suggested list of Assignments

Group A

VC++

Instructor should frame assignments on following topics :

1. WIN – 32 API programming using SDK

2. Programming Using MFC

3. Application Wizard, Class Wizard

4. Creating SDI, MDI, Dialog Based Application

5. User Interface Object

6. Database Programming

7. Using Windows Help Workshop

Instructor should frame at least four assignments based on the following sample assignments

1. Create a simple "Hello World" application using windows SDK programming.

2. Create a simple "Hello World" application using various GUI components.

3. Create a windows application (WinDir application / Drive tree application) using different GUI components and document view architecture.

4. Create a simple Paintbrush application using various GDI components.

5. Create a windows application (Word application/ Notepad application) using different GUI components using MDI architecture.

6. Create a Help file for an Application using Help Workshop.

Group B

Software Engineering

Instructor should frame at least three assignments related to Software Engineering using any professional or freeware/shareware tools like Borland ALM Suite/Rational Suite/Umbrello/Magic Draw/Gaphor/Poscidon etc. Assignments may be framed using tools like

- Rational Requisites PRO (Requirement Analysis).
- Rational Purify (coding).
- Rational Robot (Testing).
- Rational Rose/MS Visio/ArgoUML (Building Analysis Models).
- Rational Rose (Architectural Design, Metrics Analysis).
- GNATS/Bugzilla (Bug Tracking Tools).
- Macromedia Authorware/Motif Common Desktop Environment (User Interface Design).
- Assignments based on Tiny Tools available on http://www.engin.umd.umich.edu/CIS/tinytools/ Students are encouraged to use open source tools.

Group C (At least Three)

1. To develop an ActiveX DLL using Visual Basic

2. Create ActiveX Document DLL using Visual Basic and register it.

3. Create an Excel spreadsheet application with OLE automation using VB.

4. Implement an Alarm ActiveX control with its members like Start time, Count down, Stop time.

Free and Open Source Software (FOSS)

Students should work in a group to study a few Free and Open Source Software. Students should study FOSS such as Bind, Mailman, Samba, Sendmail, Mozilla, OpenOffice, Wine, Python, Zope, Plone, KDE etc. Students should make use of the Free Software for General Purpose (FSGP) – Software Library at www.imtech.res.in/fsgp/

Instructions :

Instructor should frame at least 10 assignments based on above topics and prepare guidelines for the study and write-up for the FOSS. Students will submit term work in the form of a Journal that should include at least 10 assignments and a report on study of FOSS.

Reference books

1. Prosise J., "Programming Windows with MFC", Second Edition, Microsoft Press, 1999, ISBN 81- 7853 –012 - 0.

2. Sanghavi H., "Programming with Visual C++", First edition, Vikas Publishing House, 2002, ISBN 81-259-1076-X.

3. Kruglinski D., Shepherd, Wingo, "Programming Microsoft Visual C++", Fifth edition, Microsoft press, ISBN – 81 – 7853 – 005 - 8.

4. Deitel, Deitel, Nieto, Strassberger, "Getting Started with Microsoft Visual C++ 6 with an Introduction to MFC (with compiler)", Prentice Hall, 2000, ISBN 0-13-013249-7.

5. Barker T., "Writing Software Documentation – A Task-oriented Approach", Second Edition, Pearson Education, 81 – 297 – 0660 – 1.

6. Jelen B., Syrstad T., "VBA and Macros for Microsoft Excel", Techmedia, 2004, ISBN 81-7635-734-0.

7. Roman S., "Writing Word Macros", Second Edition, O'Reilly/SPD Publication, ISBN 81-7366-077-8.

310257 : Seminar And Technical Communication

Teaching Scheme	Examination Scheme
Practical: 2 Hrs	Term Work : 50 Marks

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