

NORTH MAHARASHTRA UNIVERSITY, JALGAON
Proposed SYLLABUS for
M. Sc. (Computer Science)
(With Effect From June, 2007)

Semester-I

CS-101	Advanced C++ Programming
CS-102	Distributed Systems
CS-103	Artificial Intelligence
CS-104	Linux Operating System
CS-105	Network Programming
CS-Lab-I	Linux OS & Linux Socket Programming Lab.
CS-Lab-II	C++ Programming Lab.

Semester-II

CS-201	Java Programming
CS-202	Advanced DBMS
CS-203	Theory of Automata
CS-204	Design & Analysis of Algorithms
CS-205	Optimization Techniques
CS-Lab-III	Lab on DAA
CS-Lab-IV	Lab on JAVA Programming Lab.

Semester-III

CS-301	Compiler Construction
CS-302	Data Warehousing & Mining
CS-303	Current Computing
CS-304	Visual C++ Programming
CS-305	Software Engineering
CS-Lab-V	VC++ Lab.
CS-Lab-VI	Current Computing Lab.

Semester- IV

CS-401	Full Time Industrial Training
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Course Code: CS-101
Title: Advanced C++ Programming

Unit 1 Basic concept of c++ - Data types , operators , expression and control
Structure, classes, structure, inheritance, polymorphism **[05]**

Unit 2 Pointers, pointer arithmetic, pointer to pointer, array of pointer , pointer
constant, pointer arithmetic, pointer to function ,pointer to objects, array of
object, array of pointer to object, this pointer, self referencial classes,
dynamic memory allocation **[08]**

Unit 3 Exception handling , Error handling, exception specification, applying
exception handling, exception during objects construction and destruction,
advanced exception techniques **[04]**

Unit 4 Name spaces, The Rationale behind namespaces, historical back ground,
properties of namespaces, namespaces and version control, restriction of
namespaces. **[06]**

Unit 5 Template, class template, function template, specifying template
arguments, function template overloading, default template argument.
[08]

Unit 6 Generic programming, organization of STL Headers files , containers ,
iterators, algorithm, function object, adaptors, allocators, specialized
containers, associative containers, class auto_ptr, nearly containers, class
string **[21]**

References:-

- 1 Danny Keleve , “The ANSI/ISO C++ Professional Programmer’s Handbook”, Prentice Hall India ,Indian Reprint,1999 ISBN 81-203-1630-4
- 2 Bjarne Stroustrup, “The C ++ Progarmming Language “ ,3rd edition, Pearson Education Asia,2000 , ISBN 81-7808-126-1
- 3 Stanley B Lippman Jose Lajoie “C++ Primer” 3rd edition ,Pearson Education Asia,2000 ISBN -81-7808-048-6
- 4 David R. Musser , Atul sainsi ,”STL Tutorial & Refrences guide” , Pearson Education Asia,Second Indian Reprint 2000 ISBN -81-7808-132-6
- 5 A.L.Stevens, C++ Programming (7th Ed), Wiley-dreamtech India, 2006.

Course Code: CS – 102
Title: Distributed Systems

Unit-I

Introduction

Definition, Motivation, Goals, Hardware Concept, Software Concept, Client Server Model. [05]

Unit-II

Communication Mechanism

Communication Protocol, RPC, ROI, Message Oriented Invocation, RMI, Stream Oriented Communication [08]

Unit-III

Processes

Threads, Clients, Servers, Code Migration, Software Agents [08]

Unit-IV

Naming

Naming, Locating Mobile Entities, Removing Unreferenced Entities. [10]

Unit-V

Synchronization

Clock Synchronization, Logical Clocks, Global State, Election Algorithm., Mutual Exclusion , Distributed Transaction, Introduction to Consistency and Replication [11]

Unit-VI

Fault Tolerance

Introduction, Process Resilience, Reliable Client and Server Communication, Reliable Group Communication, Distributed Commit, Recovery. [10]

References:-

- 1) Distributed Systems: Principles and Paradigm. Andrew S Tanenbaum and Marteen Van Steen ,Pearson Education, Low Price Edition.
- 2) Distributed Systems-Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg, Third Edition, Low Price Edition, Pearson Education Asia.
- 3) Distributed Systems and Networks, William Buchanan, Tata McGraw-Hill Edition.

Course Code: CS – 103
Title: Artificial Intelligence

Unit-I

Introduction to Artificial Intelligence (AI): Definitions, AI Techniques, AI task Domains, Applications, Criteria for Success. [02]

Unit-II

Problem Solving: State Space Representation, Production Systems, Problem Characteristics, AI Problems. [05]

Unit-III

Search: Issues in Design of Search Programs, Depth First Search, Breadth First Search, Heuristic Search – Hill Climbing, Best First Search, Branch and Bound Search, A* Search, AO* Search. [08]

Unit-IV

Knowledge Representation (KR) Issues: Representation and Mappings, Issues in Knowledge Representaion, The Frame Problem. [02]

Unit-V

KR using Predicate Logic: Representing Simple Facts, Instance and ISA relationships in Logic, Computable Functions and Predicates, Unification, Resolution. [06]

Unit-VI

Structured KR: Semantic Nets, Frames, Scripts and Conceptual, Dependency (CD) Representation. [06]

Unit-VII

Statistical Reasoning: Bayes' Rule & Theorem, Certainty Factor (CF) Theory, Bayesian Networks, Dempster-Shafer Theory. [05]

Unit-VIII

Fuzzy Logic: Need, Fuzzy Set, Membership Functions, Geometry of Fuzzy Sets, Simple Operations on Fuzzy sets, Fuzzy Rules, Rule Composition and Deffuzification, Fuzzy Engineering, Applications. [05]

Unit-IX

Learning: Concept of learning, Types of Learning, General Learning Model., Genetic Algorithms, Neural Network Learning: ANNs and BNNs, Model of a Artificial Neuron, Supervised and Unsupervised Learning. [06]

Unit-X

Expert Systems: Need and Justification for Expert Systems, Architecture, Advantages, Problems, Examples, A complete case study on MYCIN Expert System. [07]

References:-

- 1) E. Rich and K. Knight, Artificial Intelligence, TMH, 2002.
- 2) D.W.Patterson, Introduction to AI and Expert Systems, Prentice Hall of India, 2001.
- 3) S. Russell, P. Norvig, Artificial Intelligence: A Modern Approach, Pearson Education Asia, 2002.
- 4) P. Jackson, Introduction to Expert Systems, Pearson Education, 2003.
- 5) Kumar Satish, Neural Networks: A Classroom Approach, TMH, 2004.

Course Code: CS-104 **Title: Linux Operating System**

UNIT-I

History and Development of Linux

A Brief History of Linux, Benefits of Linux, Acquiring and Using Linux, Examining Linux Distributions. [03]

UNIT-II

System Access

Logging In and Using the Linux System, Linux Commands, Logging In and Using Remote Linux Systems. [04]

UNIT-III

User Accounts

Creating Additional User Accounts, Creating & Managing Groups, Managing Users. [02]

UNIT-IV

Introduction to the Filesystem

Filesystem Navigation, Managing the Filesystem, Performing Filesystem Maintenance And Locating Files. [02]

UNIT-V

Working with Linux Permissions

Understanding Permissions, Changing File and Directory Permissions, Changing Default Permissions and Ownership, Setting Daemon and Process Permissions, Evaluating System Security. [03]

UNIT-VI

Creating and Viewing Files

Using the vi Editor, Using Other Editors, Examining File Contents, Redirection. [04]

UNIT-VII

Archiving Files

Archiving Files with tar, Archiving Files with cpio, Archiving Files with Other Utilities, Zipping Files, Examining Backup Issues . [04]

UNIT-VIII

Working in X Windows

Introduction to X Windows and GNOME, Managing Files and Filesystems, Customizing X Windows, Configuring X Windows, Choosing and Changing Window Managers and Desktops Remote X Window Access. [05]

UNIT-IX

Printing Files

Configuring a Local Printer, Printing, Managing Print Spools and Queues, Configuring Remote Printers. [03]

UNIT-X

Package Management

Examining Package Solutions, Managing Packages with RPM, Verifying and Repairing Applications, Upgrading and Freshening Packages. [03]

UNIT-XI

Configuring the Linux Environment

Examining Shells, Using Variables, Examining Linux Configuration Script Files, Examining System Startup Files, Examining the /etc/fstab File, Examining the cron System, Creating a Shell Scripts. [10]

UNIT-XII

Multitasking

Managing Jobs and Background Processes, Using the Process Table to Manage Processes, Introducing Delayed and Detached Jobs. [02]

UNIT-XIII

Configuring and Managing Services

Starting and Stopping Services, Identifying Core and Non-critical Services, Configuring Basic Client Services, Configuring Basic Internet Services, Working with Modules. [04]

UNIT-XIV

Managing Network Services

Identifying Networking Concepts, Configuring Basic Network Services and Settings, Managing Network Services, Managing Remote Network Serv. [03]

References:-

1. McCallister, Suse Linus-10, Pearson Education, 2006.
2. Ball, Using Linux, PHI, 1998.
3. Das, Unix: Concepts and Applications (4th Ed), TMH, 2006.
4. Foster Johnson, Welch, Anderson, Beginning Shell Scripting, Wiley India (Wrox), 2006.
5. Neil Mathew, Richard Stones, Beginning Linux Programming (3rd Ed), Wiley India (Wrox), 2006.
6. Peterson, Linux: Complete Reference (5th Ed), Peterson, TMH.

Course Code : CS-105

Title: Network Programming

Unit I : Introduction

Layered architecture, Advantages and disadvantages of layered architecture, TCP/IP model layers and their functionalities, network topologies, networking devices, IP Addressing, broadcasting and multicasting. [06]

Unit II : Protocols

Ethernet, Internet protocol, Address resolution protocol, reverse address resolution protocol, Transmission control protocol, user datagram protocol, TCP connection establishment and termination, Domain name systems, file transfer protocol, web servers, simple mail transfer protocol, telnet. [20]

Unit III : Client Server Programming using Sockets:

Client – server model (terminology and concepts), program interface to protocols, socket interface, algorithms and issues in client s/w design and server s/w design.

[06]

Unit IV : Server Designs

Iterative connection oriented, iterative connection less, multiprocess concurrent connection oriented, single process concurrent connection oriented, multiprotocol, multiservice, super server, concurrency in clients, external data representation, remote procedure call concepts, network file system concepts.

[20]

References: -

1. Douglas E. Comer, “Internetworking with TCP/IP - Principles, Protocols & Architecture”, vol.1, (3rd edition), ISBN- 81-203-1053-5, PHI.
2. W. Richard Stevens, “TCP/IP Illustrated : The Protocols”, volume 1, ISBN-81-7808-101-6, Pearson Education
3. Douglas E. Comer, David Stevens, “Internetworking with TCP/IP – Client Server Programming and Applications”, volume 3, ISBN- 81-7808-488-0 PHI.
4. W. Richard Stevens, “Unix Network Programming”, vol.1 (second edition), ISBN-81-203-2061-1,PHI

Coure Code: CS-LAB-I

Title: Linux OS & Linux Socket Programming Lab

Linux Operating System.

Instructor should ask students to give live demonstrations on:

Working with Linux Permissions: Understanding Permissions, Changing File and Directory Permissions, Changing Default Permissions and Ownership, Setting Daemon and Process Permissions, Evaluating System Security.

Creating and Viewing Files: Using the vi Editor, Using Other Editors, Examining File Contents Redirection.

Archiving Files: Archiving Files with tar, Archiving Files with cpio, Archiving Files with Other Utilities, Zipping Files, Examining Backup Issues.

Printing Files: Configuring a Local Printer, Printing, Managing Print Spools and Queues Configuring Remote Printers.

Configuring the Linux Environment: Examining Shells, Using Variables, Examining Linux Configuration Script Files, Examining System Startup Files, Examining the /etc/fstab File, Examining the cron System, Creating a Shell Scripts (Create at least five scripts).

Configuring and Managing Services: Starting and Stopping Services, Identifying Core and Non-critical Services, Configuring Basic Client Services, Configuring Basic Internet Services Working with Modules.

Managing Network Services: Identifying Networking Concepts, Configuring Basic Network Services and Settings, Managing Network Services, Managing Remote Network Serv.

Preparing for a Linux Installation: Gathering Installation Information, Creating Installation Disks, Partitioning the Disk.

Installing Red Hat Linux (or any other distribution)

Installing Red Hat Linux, Configuring Linux.

Linux Socket Programming Lab.

1. Implement client server programs to demonstrate working of TCP iterative server.
2. Implement client server programs to demonstrate working of UDP iterative server
3. Implement Client - Server programs for demonstrating working of Concurrent Connection Oriented Servers using multiple processes.
4. Implement Client - Server programs for demonstrating working of Concurrent Connection Oriented Servers using single process.
5. Implement and demonstrate the multiprotocol server.
6. Implement and demonstrate the multiservice server.
7. Implement and demonstrate the super server.
8. Implement Telnet Server program for providing different types of services.
9. Demonstrate and implement the file transfer using FTP.
10. Develop a simple web server capable of accepting request from standard clients like IE, Netscape, Opera etc. (Use standard protocol HTTP).

References:-

1. Beginning Unix (1st Ed), P. Love, J. Merlino, J.C.Reed, C. Zimmerman, P. Weinstein, Wiley-dreamtech (Wrox), 2005.
2. McCallister, Suse Linux-10, Pearson Education, 2006.
3. Ball, Using Linux, PHI, 1998.
4. Das, Unix: Concepts and Applications (4th Ed), TMH, 2006.
5. Foster Johnson, Welch, Anderson, Beginning Shell Scripting, Wiley India (Wrox), 2006.
6. M.G.Venkateshmurthy, Introduction to Unix & Shell Programming, Perason Edication, 2005.
7. Neil Mathew, Richard Stones, Beginning Linux Programming (3rd Ed), Wiley India (Wrox), 2006.
8. Peterson, Linux: Complete Reference (5th Ed), Peterson, TMH.

Course Code: CS-LAB-II
Title: Lab on C++ Programming Lab

- 1 Write a program to demonstrate encapsulation using of class
Write a program to demonstrate use of all types of Inheritance
- 2 Write a program to demonstrate use of polymorphism
- 3 Write a program to demonstrate use of function overloading
- 4 Write a program to demonstrate use of operator overloading
- 5 Write a program to demonstrate use of array of objects
- 6 Write a program to demonstrate use of pointers
- 7 Write a program to demonstrate use of pointer to members of class
- 8 Write a program to demonstrate use of Exception handling.
- 9 Write a program to demonstrate use of function templates and class templates
- 10 Write a program to demonstrate use of containers , iterators ,adaptors , allocators
specialized containers ,associative containers.

Course Code: CS– 201

Title: JAVA Programming

Unit-I

Introduction, Buzzwords, data types, variables, operators, strings, input and output, control flow, arrays, objects, classes, predefined classes, own classes, static fields and methods, method parameters, object construction, packages. [06]

Unit-II

Inheritance, super class, sub class, class Object, Array Lists, wrappers, auto boxing, reflection, environment classes, interfaces, cloning, callbacks, inner classes, proxies. [10]

Unit-III

Swings, Frame, Panel, 2D shapes, colors, fonts, images, event handlings, semantic events, low-level events, actions, multicasting, implementing sources. [08]

Unit-IV

MVC design pattern, layout management, text input, choice components, menus, dialog boxes, Applet basics, multimedia, applet context, jar files, packaging, web start, storage preferences. [10]

Unit-V

Exceptions, classification, declaring, throwing, catching, creating exceptions, logging, generic programming, generic methods, type variables, generic code, restrictions, limitations, inheritance rules, wild card types, reflection and generics. [08]

Unit-VI

Streams, stream hierarchy, zip streams, use of streams, object streams, file management. [04]

Unit-VII

JDBC, design, programming concepts, query execution, result sets, meta data, transactions, Multithreading, threads, states, interrupting, properties, synchronization. [06]

Reference:-

1. Horstman Cay, Cornell Gary, Core Java™2, Vol.1&2, seventh edition, Pearson education.
2. Herbert Schildt, The Complete Reference, seventh edition, Tata McGraw-Hill.
3. Steven Holzner, JAVA 2 Programming Black Book, Wiley India.
4. Ivor Horton, Beginning Java 2, JDK 5 Ed, Wiley India.

Course Code: CS-202

Title: Advance Database Management Systems (DBMS)

Unit-I

Database System Architecture:

Centralized & Client-Server Architectures, Server System Architectures, Parallel System (Parallel Database Architectures with NUMA Architecture), Distributed Systems, Network types. **[04]**

Unit-II

Object based Databases:

Complex data types, Structured types & Inheritance in SQL, Table Inheritance, Array & Multiset Types in SQL, Object Identity & Reference Types in SQL, Implementing Object Relational features, Persistent Programming languages, Persistent of Objects, Object Identity & Pointers, Storage & Access of Persistent Objects, Object Oriented Vs. Object Relational. **[10]**

Unit-III

XML:

Motivation, Structure of XML Data, XML Document Schema, XML Schema, Querying and Transformation, Application program Interfaces to XML, Storage of XML Data, XML Applications. **[10]**

Unit-IV

Parallel Databases:

Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism. **[12]**

Unit-V

Distributed Databases:

Introduction, Homogeneous and Heterogeneous Databases, Distributed Data Storage, Data Fragmentation with reasons, Degree of fragmentation, Correctness rules of fragmentation, Horizontal, Vertical and Hybrid fragmentation, Distributed Transactions, Commit Protocols, Concurrency Control in Distributed Databases, Deadlocks Handling, Availability, Distributed Query Processing, Heterogeneous Distributed Databases. **[12]**

Unit-VI

Advance Transaction Processing:

Remote Backup System, TP Monitors, Transactional Workflow, Long Duration Transaction, Main Memory Databases. **[06]**

References:-

- 1) Database System Concepts Abraham Silberschatz, Henry F. Korth, Sudarshan McGraw Hill International Publication ,International Edition , Fifth Edition.
- 2) Principles of Distributed Database Systems M. Tamer Ozsu , Patrick Valduriez Pearson Education, Low Price Edition, Second Edition

Course Code: CS-203

Title: Theory of Automata

UNIT-I

Finite Automata (FA): Definition, Description, Transition Systems, Transition Function, Acceptability of a String, NFA, DFA, Equivalence of DFA and NFA, Melay and Moore Models, Minimization of FA, Applications of FA. [08]

UNIT-II

Introduction to Formal Languages: Basics, Chomsky Classification of Languages, Languages and their Relation, Languages and Automata. [04]

UNIT-III

Regular Expressions and Regular Grammar: Regular Expressions, FA and Regular Expressions, Pumping Lemma for Regular Sets, Applications of Pumping Lemma, Closure Properties of Regular Sets, Regular Sets and Regular Grammars. [08]

UNIT-IV

Context-free Languages (CFLs): CFLs and Derivation Trees, Ambiguity in Context-free Grammars (CFGs), Simplification of CFGs, Normal Forms for CFGs (CNF and GNF), Pumping Lemma for CFLs, Decision Algorithms for CFLs. [08]

UNIT-V

Pushdown Automaton (PDA): Informal Description, Basic Definitions, Acceptance by a PDA, PDA and CFLs. [09]

UNIT-VI

Turing Machines (TM): Basics, The Turing Machine Model, Computable Languages and Functions, Representation of TMs, Language Acceptability by TMs, Design of TM, Halting Problem of TMs. [09]

UNIT-VII

Computability: Basic Concepts, Primitive Recursive Functions, Recursive Functions, Partial Recursive Functions and TM. [06]

References:-

- 1) John C. Martin, Introduction to Languages and The Theory of Computation, TMH, 2003.
- 2) J. E. Hopcraft, R. Motwani and J. D. Ullman, Introduction to Automaton Theory, Languages and Computation, Pearson Education Asia, 2003.
- 3) K.L.P. Mishra, N. Chandrasekaran, Theory of Computer Science, PHI, 2001.

Course Code: CS-204
Title: Design & Analysis of Algorithms

Unit-I

Algorithms properties, areas of studies, recursion, analyzing algorithms, recurrence, binary trees, heaps and heapsort, sets and disjoint set union, graphs.

[06]

Unit-II

Divide and conquer, binary search with its variants, Maxmin, mergesort, quicksort, selection, strassen's matrix multiplication.

[08]

Unit-III

Greedy method, optimal storage on tapes, knapsack problem, single source shortest path, minimum spanning trees.

[08]

Unit-IV

Dynamic programming, graphs and its variants, breadth first search, depth first search, code optimization, topological sort.

[10]

Unit-V

Backtracking, queen problem, N-queen problem, graph coloring problem, branch and bound technique, LC-search.

[10]

Unit-VI

Non deterministic algorithms, searching, sorting, classes:NP hard and NP complete, approximation algorithms, job scheduling, minimum degree of spanning tree.

[10]

Reference:-

1. E Horowitz and S. Sahani, Fundamentals of Computer Algorithm, Galgotia Publications, 1991.
2. Sanjay Dasgupta, Christos Papadimitriou and Umesh Vazirani, Algorithms, Tata McGraw-Hill Edition.

3. Aho, Hopcroft and Ullman, The Design and Analysis of Algorithms, Addison-Wesley Publication, 2000
4. Simon Harison, James ross, Algorithms, Wiley India, 2006
5. Jon Kleinberg and Eva tardos, Algorithm Design, Pearson education, 2006

Course Code: CS-205
Title: Optimization Techniques

Unit 1. Introduction to Operational Research

Introduction to O.R., Necessity of OR in Business and Industry, Scope of OR in modern management, OR and Decision Making. **[04]**

Unit 2. Linear programming

Formulation, Identification of decision variables, Constructing Objective Functions and Constraints, Assumptions, Methods of Solution: Graphical Method, Simplex method. **[12]**

Unit 3. Duality theory and Sensitivity Analysis

Duality theory: Existence of Dual of a LP problem, Primal Dual relationships in formulation and their solutions. Sensitivity analyses or Post Optimality Analysis: Dual Simplex Method, Changes affecting feasibility, Changes affecting optimality. **[10]**

Unit 4. Transportation and Assignment problems

The transportation algorithm: Formulation as a LP problem, Determination of Initial solutions, Stepwise Improvement to obtain optimal solution, Special cases Such as Multiple, Unbalanced, Degeneracy etc., The assignment model: Formulation as TP, The Hungarian method of solution. **[10]**

Unit 5. Network models

Critical Path Analysis (CAP): Network representation of simple projects., Critical path computation: Construction of time schedule, Crashing of project duration. **[08]**

Unit 6. Game theory

Formulation of Two-person Zero-sum game: Solution of simple games, Mixed strategy games, Solving using Graphical Method, Solving Using LP, Saddle point Condition. **[08]**

Reference:-

1. Introduction to Operations Research (Frederick S.Hiller, Gerald J.Lieberman), McGraw-Hill Companies

2. Operations Research An introduction (Hamdy A. Taha), Prentice-Hall
3. Quantitative Techniques, L.C. Jhamb, Everest Publishing house.

Course Code: CS–Lab-III
Title: Design and Analysis of Algorithms (DAA)

1. Write a program to implement removal of recursion for
 - Finding maximum from array
 - Binomial coefficient $B(n,m) = B(n-1, m-1) + B(n-1,m)$,
 $B(n,n) = B(n,0) = 1$
 - Searching element from array
2. Write a program for creating max./min. heap using
 - INSERT
 - ADJUST/HEAPIFY
3. Write a program to implement union and find operation.
4. Write a program to find minimum and maximum from a given array.
5. Write a program for searching element from given array using binary search for $n=1000,2000,3000$ find exact time of execution.
6. Write a program for sorting given array in ascending/descending order with $n=1000,2000,3000$ find exact time of execution using
 - Heap sort
 - Merge sort
 - Quick sort
7. Write a program for matrix multiplication using Strassen's matrix multiplication.
8. Write a program to find solution of Knapsack instance.
9. Write a program to find minimum spanning tree using prim's/kruskal's algorithm.
10. Write a program to find shortest path using single source shortest path.
11. Write a program to find shortest path using all pair path.
12. Write a program to implement breadth first and depth first traversal.
13. Write a program to implement topological sort.
14. Write a program to implement breadth first and depth first traversal.
15. Write a program to implement CODE1.
16. Write a program to implement CODE2.
17. Write a program to find all solutions for 8-queen problem using backtracking.
18. Write a program to find only inequivalent solutions for 8-queen problem using backtracking.
19. Write a program for graph coloring using backtracking.

Course Code: CS–Lab-IV
Title: JAVA Programming

1. Write a program that demonstrate program structure of java.
2. Write a program that demonstrate string operations.
3. Write a program that demonstrate package creation and use in program.
4. Write a program that demonstrate inner class.
5. Write a program that demonstrate inheritance.
6. Write a program that demonstrate 2D shapes on frames.
7. Write a program that demonstrate text and fonts.
8. Write a program that demonstrate event handling for various types of events.
9. Write a program to illustrate multicasting.
10. Write a program to illustrate use of various swing components.
11. Write a program that demonstrate use of dialog box.
12. Write a program to create own dialog box.
13. Write a program to create toolbar, menu & popup menu.
14. Write a program to implement file handlings.
15. Write a program that demonstrate Applet programming.
16. Write a program to implement generic programming.
17. Write a program that demonstrate JDBC on applet/application.
18. Write a program that demonstrate multithreading.

Course Code: CS-301
Title: Compiler Construction

Unit-I

Introduction to Compiler: Translation issues: why to write compiler, compilation process in brief, compiler construction tools, Interpreter and related issues. **[04]**

Unit-II

Lexical Analysis: Introduction to Lexical Analysis – alphabet, token, lexical error, Block schematic of lexical analyzer, Explanation of NFA, DFA, Conversion from NFA to DFA, R E to optimized DFA, time vs. space complexity. Construction of Lexical Analyzer – Automatic construction of Lexical Analyzer (LEX), LEX specification details. **[04]**

Unit-III

Syntax Analysis: Introduction – Role of parsers and issues of separating lexical and syntax analysis, Types of grammar, CFG introduction, Expressing language through CFG. Basic concepts in parsing – leftmost derivation, rightmost derivation, derivation tree, sentence, sentential form, language, derivation, parse tree, Ambiguous grammar. Representation of CFG – Backous Naur Form, recursive rules, etc., Precedence and associativity, Disembogues grammar.

Parsing technique – Top down – Recursive decent parser, Predictive or LL (1) parser, Bottom up : - Shift – Reduce, OPP, SLR, LR (1), LALR, etc. (I/P, O/P, data structures required, block schematic, algorithm, limitations, efficiency to be covered about all above parsers).

Automatic construction of parser (YACC), YACC specifications file details, error detection and recovery in YACC. **[25]**

Unit-IV

Symbol table organization : Comparison of different intermediate code forms, Intermediate code generation for declaration, assignment, iterative statements, case statements, arrays, structures, conditional statements, Boolean expressions, procedure / function definition and call. **[05]**

Unit-V

Intermediate forms of Codes: Polish notation, Quadruples, triples, Indirect triples, Blocks. **[08]**

Unit-VI

Code Optimization :

Introduction, Principle sources of optimization, machine dependent optimization, machine independent optimization, Optimizing transformation, compile time evaluation, Common expression evaluation, value propagation, code movement and loop invariant computation, strength reduction, loop test replacement, dead code elimination. [06]

References :-

1. Aho A.V., R. Sethi and J.D. Ullman, "Compiler Principle, Techniques and Tools", Addison Wesley.
2. Barret, Couch, "Compiler Construction Theory and Practice", Computer Science series, Asian Student Edition.
3. Dhamdhare D.M, "Compiler Construction Principle and Practice", McMillan India.
4. Gres D., "Compiler Construction for Digital Computer", Wiley.
5. Holub A.J., "Compiler Design in C", Prentice Hall.
6. Tremblay, Sorenson, "Theory and Practice of Compilers".
7. "LEX and YACC", O'relly.
8. Muchnik, "Advanced Compiler Design and Implementation".

Course Code: CS-302

Title: Data Warehouse and Data Mining

Unit-I

Introduction to Decision Support System: DSS Defined, History of DSS, Ingredients of DSS, Data and Model Management, DSS Knowledge base, User Interfaces, The DSS Users, Categories and Classes of DSSs. [04]

Unit-II

Introduction to Data Warehousing: Why all the excitement?, The need for Data warehousing, Paradigm shift, Operational and Informational data, Data Warehouse definition and characteristics, Operational Data Stores. [06]

Unit-III

Data Warehousing Components: Overall Architecture, Data Warehouse Database, Sourcing, Acquisition, Cleanup and Transformation Tools, Metadata Access Tools, Query and Reporting Tools, Applications OLAP, Data Mining, Data Visualization, Data Marts. [08]

Unit-IV

Building a Data Warehouse: Design consideration, Technical consideration, Implementation consideration, Benefits of Data Warehousing. [06]

Unit-V

Mapping the Data Warehouse to Multiprocessor Architectures: Relational Database technology for Data Warehouse, Database Architecture for Parallel Processing. [06]

Unit-IV

DBMS Schemas for Decision Support: Data layout for best access, Multidimensional Data Model, Star Schema, STARjoin and STARindex, Snowflake Schema, Straflake Schema. [08]

Unit-VII

Metadata: Metadata defined, Metadata Interchange, Initiative, Metadata Repository, Metadata Management [08]

Unit-VIII

Data Mining and Data Visualization: What is Data Mining?, OLAP, Need for OLAP, OLAP guidelines, MOLAP, ROLAP, HOLAP, Techniques used to Mine the Data, New Applications for Data Mining, Market Basket Analysis, Current limitations and Challenges to Data Mining, Data Visualization, Application of Data Visualization Techniques. [06]

References:-

- 1) Decision Support System : In the 21st Century, George M. Marakas, Third Edition, Prentice Hall Publication.
- 2) Building the Data Warehouse, Willium Inman (4th Ed), Wiley-dreamtech India, 2006.
- 3) Data Warehousing , Data Mining & OLAP, Alex Berson, Stephen J. Smith, Tata McGraw Hill Edition. ISBN: 0-07-058741-8
- 4) R. Kimball, L.Reeves, M.Rass, W. Thornthwaite, The Data Warehouse Lifecycle Toolkit, Wiley India, 2006.
- 5) Decision Supprt System Janakirama Surekesi
- 6) Building a Data Warehouse for Decision Support System, Vindette Poe, Prentice Hall Publication
- 7) The Official Client-Server guide to Data Warehousing, Harjinder Gill, Prakash Rao ISBN:0-7897-0714-4

Course Code: CS-303
Title: Current Computing Trends

The objective of this course is to teach the latest technology in demand by the market/IT industry. As this course will have to be taught after one year from today(30/03/2007), hence the detailed syllabus of this course would be framed at the relevant time by the BOS and would be circulated to the affiliated Colleges/Institutes.

Course Code: CS-304
Title: Visual C++ Programming

Unit-I

Introduction: Windows difference, Windows Architecture, General structure of writing, Windows program Programming Hurdles. [02]

Painting with text & GDI: Painting and repainting logic, Introduction to GDI, Scroll bar logic, Keyboard, Mouse and timer messages, Various API function for drawing different simple graphics objects, GDI Objects. [02]

Unit-II

Windows, Visual C++ and Application Frameworks Fundamental.

Microsoft Windows and Visual C++

Windows Programming Model, Visual C++ Components. [02]

The Microsoft Foundation Class Library Application Framework :

Use of Application Framework, Application Framework, MFC Library Message Mapping , Documents & Views. [02]

Units-III

The MFC Library View Class:

Getting Started with App Wizard – “Hello World”.

Single document Interface Vs. Multiple document Interface, The “Do-Nothing”

Application, The Cex03 a View Class, Drawing Inside the View Window – The Windows Graphics Device Interface, Preview of the Resource Editors, Win 32 Debug Target Vs. Win 32 Release Target, Enabling the Diagnostic Macros, Understanding

Precompiled Headers, Two way to Run a Program. [03]

Basic Event Handling, Mapping Modes and a Scrolling View:

Getting User Input – Message Map Function, Mapping Modes, A Scrolling View Window, Other Windows Messages. [02]

The Graphics Device Interface, Colors and Fonts:

The Device context |Classes, GDI Objects, Windows color Mapping, Fonts. [02]

The Modal Dialog and Windows Common Controls:

Modal Vs. Modeless Dialogs, Resources and Controls, Programming a Model Dialog, The Dialog That Ate Cincinnati, Enhancing the Dialog program, Identifying Control: CWnd Pointers & Controls IDS, Setting the Color for dialog Background and For controls, Painting Inside the Dialog Window, Adding Dialog controls at Runtime, Other Control Features, Windows Common Controls. [03]

The Modeless Dialog and Windows Common Dialogs:

Modeless Dialogs, Cform View Class, Windows Common Dialogs. [02]

Using ActiveX Controls: ActiveX Controls Vs. Ordinary Windows Controls, Installing ActiveX Controls, Calendar Control, ActiveX Control Container Programming, ActiveX Control in HTML Files, Creating ActiveX Controls, Picture Properties, Bindable Properties. [04]

Bitmaps: GDI Bitmaps and Device Independent Bitmaps, Using GDI bitmaps, Using Bitmaps to Screen Display, DIBS and Cdib Class, Putting Bitmaps on Pushbuttons. [03]

Unit-IV

The Document – View Architecture:

Menus, Keyboards Accelerators, the Rich Edit Controls & Property Sheets:

Main Frame Window and Document Classes, Windows Menus, Keyboard Accelerators, Common Processing, Application Frame Work Built – In Items, MFC text Editing Options, Property Sheets, Cmenu Class, Creating Floating Pop-up, Menus, Extended Command Processing. [04]

Toolbars and Status Bars:

Controls bars and Applications Frameworks, Toolbars, Tooltips, Locating the Main Frame Window, Status bar. [02]

A Reusable Frame Window Base Class:

Cpersistent Frame Class, CFrameWnd Class and Activate Frame Member Function, PreCreate Window Member Function, Windows Registry, Static data Member, Default Window Rectangle, Persistent Frames in MDI Application. [04]

Separating the Document From its View:

Document – View Interaction Function, View Application, CFromView Class, Cobject Class, View Interaction, Cdocument :: Delete Contents Function, CobList Collection Class. [03]

Splitter Windows and Multiple Views:

The splitter window, View options, Dynamic and static splitter windows, A single view class SDI dynamic splitter, A Double View class SDI static splitter, Switching view classes without a splitter, A multiple view class MDI application. [03]

Unit-V**Reading & Writing documents SDI & MDI Application:****MFC Program without Document or view Classes:**

A Dialog based application, An SDI application, An MDI application. [01]

Database Management:

Advantage of Database Management, SQL, ODBC Standard, MFC ODBC Classes – Crecordset and Cdatabase, The Student Registration Database, Filter and Sort Strings, Joining two Database Tables, Multiple Recordset, ODBC Multithreading, Bulk Row Fetches, Use of Recordset Without binding. [04]

Database Management With Microsoft Data Access Objects:

DAO COM and the Microsoft jet Database Engine, DAO and VBA, DAO and MFC, Using DAO in ODBC mode, DAO Table – Type Recordset, DAO Query Defs and Table Defs, DAO Multithreading, Displaying Database Rows in Scrolling Window, Programming Dynamic Recordset. [03]

WinInet:

Introducing WinInet, WinInet classes, Writing an HTTP application. [02]

Reference:-

1. Charles Petzold, Windows Programming, Microsoft Press.
2. David J. Kruglinkski, Programming Microsoft VC++, Microsoft Press.
3. Kate Gregory, Special Edition Using Visual C++, PHI.
4. Clayton Walnum, Windows 98 Programming Secrets, IDG Books.
5. Horton Ivor, Beginning Visual C++ 2005, Wiley India.
6. Holzner steve, Professional Visual C++ 6 Programming, Wiley India.

Course Code: CS-305
Title: Software Engineering

Unit-I

Introduction:

Software Engineering, Software Characteristics, Software Crisis & Myths, Software Application, The Evolving role of Software. [03]

Unit-I I

The Product & The Process:

A layered Technology, The Software Process, Software Process Models, Linear Sequential Model, The Prototype model, RAD Model, Spiral Model, Evolutionary Software Process model, Basic Web process Model, Modified Waterfall Model, Joint Application Development model, Fourth generation Techniques. [10]

Unit-III

Analysis Concept and Principle:

Requirement Analysis, Analysis principle, Software prototyping, specification review, Analysis Modeling, The Elements of analysis model, Data Modeling, Functions modeling and information flow, Behavioral modeling, the mechanics of structured Analysis, The Data Dictionary. [06]

Unit-IV

Design Concepts and Principle:

Project planning, cost estimation model, Software Design and software Engineering, Design process, Design principles, Design concepts, effective modular design, Design Heuristics for Effective modularity, The Design model, Design Documentation, Architectural Design, Software architecture, Data design, User Interface Design, Elements of good Design, Design Issues, Feature of modern GUI, software metrics. [10]

Unit-V

Software Quality Assurance:

Quality Concept, SQA, Software Reviews, FTR, Formal approaches to SQA, Statistical SQA, Software reliability, The ISO 9000 Quality Standards, The SQA Plan. [08]

Unit-VI

Software Configuration Management:

SCM, SCM Process, Identification of Objects in Software Configuration, Version Control, Change Control, Configuration Audit, Status Reporting, SCM standards. [04]

Unit-VII

Client- Server Software Engineering:

The Structure of C-S Systems, Software Engineering for C/S systems, Analysis model Issues, Design for C/S systems, Testing Issues, software maintenance. [06]

Unit-VIII

Web Engineering:

The attribute of Web based application, The WebE Process, Framework for WebE Design and Testing for Web based application [05]

References :-

- 1) Software Engineering : A Practitioner's Approach, Roger S Pressman 7th Edition McGraw Hill International Publication.
- 2) The Complete Reference : Web Design, Thomas A Powell. McGraw Hill International Publication.
- 3) S. Mantel, J. Meredith, S. Shafer, M. S. Sutton, M. Gopalan, Project Management, Wiley India, 2006.
- 4) K. V. K. K-Prasad, Software Testing Tools, dreamtech Press, 2006.

Course Code: CS-Lab-V

Title: Lab on Visual C++ Programming

Laboratory Assignments:

Windows Programming

1. Write a Window program to demonstrate line drawing with right mouse button. The color & width of line should change with every new line.
2. Write a Window program that display small rectangles with every left mouse click, double clicking on existing rectangle should erase the rectangle.
3. Write a Window program to display size of window and no.of left button clicks, no of right button clicks and no. of double clicks. This data should be displayed on two separate lines. Size should be updated when user resizes the window object.
4. Write a Window Program to draw Sine Wave on client area.
5. Write a Window program to create filled rectangles and circles on alternate left click. New figure should not erase the previous one.
6. Write a Window program to change background color of the window after every 2 seconds. And at each mouse click the fill pattern should change.
7. Write a Window program to create a window object. Drag the left mouse button & display rectangle for which dragged line is a diagonal. Also demonstrate mouse capturing.

8. Write a Window Program to draw following shapes on client area when the user presses the keys : C – Circle, R-Rectangle, E-Ellipse, L-Line, G-Round Rectangle.

Visual Programming

1. Create a SDI application that displays a dialog box with two fields viz. User name, password & two push buttons. The dialog box is invoked when user start the application. After user presses on 'ok' button display the contents of user name and password in the client area.
2. Create SDI application to display the dialog box through menu. The dialog box should contain three scroll bars(red, green, blue) and an edit box. The color of the edit box should change when user drags the scrollbar.
3. Create a SDI application that displays a dialog box by clicking mouse left button with five fields : Name, age(spinner control), check boxes for qualification, Radio buttons for sex & drop down combo box for designation. As the user fills in this information in the dialog box & press 'OK' button display the data entered by the user in the client window.
4. Create a SDI application to place a slider, progress bar control on client area and as user moves slider control, set the value of the progress bar accordingly.
5. Create SDI application to Demonstrate Calendar ActiveX control. Implement at least any four methods of calendar control.
6. Create a SDI Application to display a dialog box through toolbar. The dialog box should contain an edit box, two buttons: Add, Remove and a List box. Whenever user enter a string in the edit box and presses the Add button data should be added to the list box. If user select some item in the list box and press the remove button, that item should be deleted from the list box.
7. Write a SDI Application to the fill client area by creating your own bitmap file.
8. Write a SDI Application to demonstrate the use of CFileDialog, CColorDialog, CFontDialog base classes.
9. Create a SDI application with following menu options. Display the selected menu items in the client window. Menu Item should have check marks on it when selected. Color : Red ,Green, Blue, Black, White.Change the background color of client area accordingly use ON_COMMAND_RANGE macro.
10. Write a SDI Application that should display a dialog box on left click. The dialog box should contain one tree control, three edit boxes for entering class name, and names of two students, and button Add. When user fills the data and clicks Add button, the data should be added to the tree in proper hierarchy. E.g.

M.Sc

Student1

Student2

11. Create a SDI application with splitter window, it splits in two horizontal panes. The upper pane is data entry area for entering the person information. When user enters this information and click Ok, it should be displayed in lower pane.
12. Create A SDI application . Create property sheet with three pages:
Page1: contains one edit box for entering a name.
Page2: contains one radio button for sex
Page3: contains list box for designation. If ok is pressed then entered information is display on client area.
13. Create SDI application to Demonstrate RichEdit Control on client area. Take three buttons (Bold, Italic, Underline) on toolbar. Apply proper formatting to the text in RichEdit control.
14. Create SDI application to Demonstrate Doc-View Architecture for the following: Take any two data members in Document class, update and retrieve those data members from view class. Note: Use Dialog box for updation.
15. Create your own class CMessage having data members
CString : Name;
CString : Address;
int : Phone number. Make it Serialiazable.
16. Create a SDI application. Create a access database with a single table of your choice. Fill at least five six records in it. Display the contents of table in the multi column list view.
17. Create a SDI Application to demonstrate HTTP server.

Course Code: CS-Lab-VI

Title: Lab on Current Computing Lab.

The practical assignments of this course are based on the theory course CS-303, hence the list of assignments would be prepared at the time of framing the detailed syllabus as mentioned above.

Cours Code:CS-401

Title: Full time Industrial Training