॥ अंतरी पेटवू ज्ञानज्योत ॥

NORTH MAHARASHTRA UNIVERSITY,
Jalgaon – 425 001

Syllabus for M. Sc.
(Computer Science)

As per UGC guideline
(w.e.f. June, 2004)

NORTH MAHARASHTRA UNIVERSITY, JALGAON
SYLLABUS for M. Sc.(CS) - Master of Science in Computer Science
(With Effect From July, 2004)

Semester	Course	Title of Paper	Marks	Hours/ Week
I.	CS – 101	Data Structures	100	4
	CS – 102	Distributed Systems	100	4
	CS – 103	Artificial Intelligence	100	4
	CS – 104	Optimization Algorithms	100	4
	CS – 105	JAVA Programming	100	4
	CS-Lab. I	Data Structures Lab.	100	8/batch
	CS-Lab. II	JAVA Programming Lab.	100	8/batch
II.	CS – 201	Design & Analysis of Algorithms	100	4
	CS – 202	Advance DBMS	100	4
	CS – 203	Data Warehousing & Mining	100	4
	CS – 204	Network Programming	100	4
	CS – 205	Theoretical Computer Science	100	4
	CS - Lab. III	Design & Analysis of Algorithms	100	8/batch
	CS – Lab. IV.	Network Programming Lab.	100	8/batch
III.	CS 301	Compiler Construction	100	4
	CS – 302	Software Engineering	100	4
	CS – 303	Internet Computing	100	4
	CS – 304	Visual Programming	100	4
	CS – 305	C# Programming	100	4
	CS – Lab. V	Internet Computing Lab.	100	8/batch
	CS - Lab. VI	Visual Programming Lab.	100	8/batch
IV.	CS 401	Industrial Training	300	

Course Code : CS – 101
Title : Data and File Structure

Elementary data Structures :

Organization, primitives and composite data types, data structures, operators, mathematical notations ADTs, algorithms notations and primitive analysis. Over view of arrays records, structures, matrices, stacks, queues, deques, polish notation, linked list, circularly linked list, doubly linked list (insertion, deletion, searching, sorting). [12]

Trees:

Different types including binary, full binary, complete binary, binary search, balanced binary trees (including AVL trees, heaps, multiway search trees and B, B^+ trees, B* trees) traversal, insertion, deletion of nodes in these types of trees. [14]

Internal sorting techniques:

Bubble sort, selection sort, insertion sort, radix sort, quick sort, merge sort and heap sort. Introduction to external sorting and merging. [10]

Graphs:

Representation variants, single source shortest path algorithm, transitive closures, connected components, traversal techniques. Minimum spanning tree algorithms. [8]

File organization:

Sequential file organization, Variable length records, text files, indexing structures, B tree as index structure, index file, ISAM, index sequential files, line sequential files, hashing, direct files, inverted files. [8]

Reference:

1. Aho, Hopcroft and Ullman, Data Structures, Galgotia Publications, 2000.
2. Rick Decker, Data Structures, Prentice Hall, Englewood Cliffs, New Jersey, 1989.
3. Tremblay and Sorenson, An Introduction to Data Structures with Applications, TMH, 2000.

Course Code : CS 102
Title : Distributed Systems

Introduction :

Definitions, motivation, goals, hardware concepts, software concepts, client server model. [5]

Communication mechanisms :

Communication protocols, layered, RPC, ROI, message oriented invocation, RMI, and stream oriented communication. [11]

Naming :

Naming, Locating mobile entities, removing un-referenced entities. [8]

Synchronization .

Clock synchronization, logical clocks, global state, election algorithms, mutual exclusion, distributed transaction. Introduction to consistency and replication. [10]

Fault Tolerance:

Introduction, process resilience, reliable client-server communication, reliable group communication, distributed commit, recovery. Introduction to object based systems. [10]

Distributed File Systems :

Sun Network File System, the Coda File System, other distributed file systems, comparison of distributed file systems. [8]

Reference:

1. Andrew S. Tannenbaum and Maarten van Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2002.
2. Vijay K. Garg, Elements of Distributed Computing, Wiley, 2002.

Course Code : CS – 103
Title : Artificial Intelligence

Introduction to Artificial Intelligence (AI) :
Definitions, AI Techniques, AI task Domains, Applications, Criteria for Success. [5]

Problem Solving :
State Space Representation, Production Systems, Problem Characteristics, AI Problems. [5]

Search :

Issues in Design of search Programs, Depth First Search, Breadth First Search, Heuristic Search – Hill Climbing, Best First Search, A* Search, AO* Search, Mini-max search : Alpha-Beta cut offs. [7]

Knowledge Representation (KR) Issues :

Representation and Mappings, Issues in Knowledge Representation, The Frame Problem. [3]

KR using Predicate Logic :

Representing Simple Facts, Instance and ISA relationships in Logic, Computable Functions and Predicates, Unification, Resolution. [8]

Structured KR :

Semantic Nets, Frames, Scripts and Conceptual Dependency (CD) Representation. [6]

Statistical Reasoning :

Bayes' Theorem, Certainty Factor (CF) Theory, Bayesian Networks, Dempster-Shafer (DS) Theory, Fuzzy Logic: Fuzzy Sets, Membership Functions, Basic Fuzzy Set Operations, Fuzzy Relations. [8]

Learning :

Concept of learning, Types of learning, General Learning Model, Genetic Algorithms, Neural Network Learning: Artificial Neural Networks and Biological Neural Networks, Model of Artificial Neuron, Supervised and Unsupervised Learning. [7]

Expert System :

Need and Justification for Expert Systems, Architecture, Advantages, Problems, Examples. [3]

Reference :

1. E. Rich, K. Knight, Artificial Intelligence, TMH, 2002.
2. D.W. Patterson, Introduction to AI and Expert Systems, Prentice Hall of India, 2001.
3. S. Russel, P. Norvig, Artificial Intelligence : A Modern Approach, Pearson Education Asia, 2002.
4. Kumar Satish, Neural Networks : A Classroom Approach, TMH, 2004.
5. D.W. Rolston, Principles of Artificial Intelligence and Expert Systems Development, McGraw Hill, 1988.

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Course Code : CS – 104
Title : Optimization Algorithms

Linear Programming :

Graphical method for two dimensional problems – Central problem of linear programming – various definitions – statements of basic theorems and properties – Phase I and Phase II of the simplex method - revised simplex method - primal and dual – dual simplex method – sensitivity analysis. [24]

Transportation Problems:

North-West corner rule, Least Cost Method, Vogel's Approximation Method, Balanced and Unbalanced problem, Degeneracy problem. [12]

Assignment Problems :

Hungarian Method, Balanced and Unbalanced problem. [8]

Queueing Theory :

Characteristics of queueing systems – steady state M/M/1, M/M/1/K and M/M/C queueing models. [8]

PERT and CPM

Arrow networks - time estimates – earliest expected time, latest allowable occurrence time and slack – critical path – probability of meeting scheduled date of completion of project – calculations on CPM network various floats for activities – critical path – updating projects – operation time cost trade off curve – project time cost trade off curve – selection of schedule based on cost analysis.

References

1. Gillet, B.E., "Introduction to Operations Research A Computer Oriented Algorithmic Approach", Tata McGraw Hill, New York, 1990.
2. Hillier F., and Lieberman, G.J. "Introduction to Operations Research", Holden day, New York, 1985.
3 Kambo N.S , "Mathematical Programming Technqies", McGraw Hill, New York, 1985.
4. Kanti Swarup, Gupta, P.K., and Man Mohan, "Operations Research", Sultan Chand & Sons, New Delhi, 1990.
5. Mital K.V., "Optimization Methods in Operations Research and System Analysis", New Age International (P) Ltd., New Delhi, 1992.
6 Saffer L.R., Fitter J.B. and Meyer W.L., "The Critical Path Method", McGraw Hill, New York, 1990.
7 Taha, H A , "Operations research – An Introduction", McMillan Publishing Co., 1986

Course Code : CS – 105
Title : JAVA Programming

Introduction to JAVA :

Advantages over other Languages, Buzzwords of Java, Java and Internet Comments, Data types, variable operators, strings, control flow statements, Arrays. [4]

OOPS in JAVA

Objects, Relationship between classes, static fields and methods, object construction. Package, Inheritance, Class object, class Class, Reflection, Interfaces and inner classes. [6]

Graphics Programming

Creating a Frame, Frame positioning, Displaying Information in a Panel, 2D shapes Colors, Text and Fonts, images. [8]

Event Handling :

Basics of Event handling, AWT Event Hierarchy, Semantic and low-level events in the AWT, Event handling summary, individual events, Actions, multicasting, Event Queue. [9]

User Interface Components with Swing :

Model-View-Controller Design Pattern, Layout management, Text input, choice controls, Menus, Dialog boxes. [9]

Applets :

Applet Basics, HTML tags and attributes, multimedia, Applet context, JAR files. [3]

Exception Handling :

Dealing with errors, catching exceptions, Assertion, JDB debugger. [3]

Streams and Files :

Streams, complete stream zoo, ZIP file stream, putting steams to use, object streams, File management. [4]

Multi Threading :

Basics of threading, Thread properties, interrupting threads, selfish threads, thread groups, Synchronization, timers. [4]

JDBC :

Basic JDBC programming concepts, populating a Database, Executing queries, metadata, Result sets. [2]

Reference :

1. Core Java Vol. I (Addison – Wesley), Sun Press, ISBN – 981-405-861-0.
2. Core Java Vol. II (Addison – Wesley), Sun Press, ISBN – 981-4058-50-5.
3. Java-2 : The Complete Reference, TMH (5th Edn.).

Course Code : CS – Lab. I
Title : Data Structures Lab.

Implementation of application programs based on

- Arrays records and pointers
- Ordered list traversing (insertion, deletion, searching)
- Multidimensional arrays
- Records, structures
- Matrices
- Stacks
- Queues
- Deques
- Polish notation
- Linked list
- Circularly linked list
- Doubly linked list (insertion, deletion, searching)

Implementation of programs based on trees (creation, traversal, insert, find, delete etc.)

- Full binary
- Heap
- Binary search tree
- Balanced binary trees (AVL trees, B trees, B^+ trees)

Implementation of programs for sorting techniques

- Bubble sort
- Selection sort
- Insertion sort
- Radix sort
- Quick sort
- Merge sort
- Heap sort

Implementation of programs based on graphs

- Depth first traversal
- Breadth first traversal
- Single source shortest path algorithm by Dijkstra
- Transitive closures matrix
- Minimum spanning tree algorithms by Prim and Kruskal

Course Code : CS – Lab. II
Title : JAVA Programming

Laboratory Assigaments :

1. Write a program to demonstrate use of Array.
2. Implementation of stack & queue.
3. Write a program to demonstrate use of inheritance in java.
4. Write a program to demonstrate use of String.
5. Demonstrate use of inner classes in java.
6. Write a program to draw 2D shapes in a frame based application.
7. Write a program to demonstrate text and fonts in an frame based application.
8. Write program to demonstrate mouse event handling.
9. Write a program to demonstrate Keyboard event handling.
10. Program to illustrate multicasting.
11. Write a program to illustrate use of text field, text area, Radio button, List, Check Box, button, slider, combo box controls.
12. Program to implement Applet.
13. Program to illustrate multithreading.
14. Write a program to illustrate use of Dialog box.
15. Write program to implement File handling.
16. Program to illustrate data management using JDBC.
17. Program to illustrate menu & popup menu.

Course Code : CS – 201
Title : Design & Analysis of Algorithms

Introduction to algorithm:

Properties, area of studies, recursion and recursive programs, removal of recursion, analysis of algorithms, asymptotic notations, examples for obtaining complexities. [6]

Tree:

Binary tree and variants, heaps and heap sort sets, disjoints set union algorithm and complexities of these algorithms. [6]

Divide and conquer:

Binary search and its variants and complexities, MaxMin algorithm, Merge sort, Quick sort, Strassen's matrix multiplication algorithm and complexities of these algorithms. [8]

Greedy technique:

Optimal storage on taps, knapsack problem, Huffman code generation, Dijkstra's Algorithm for shortest path problem and complexities of these algorithms. [6]

Dynamic programming:

All pair shortest path problem, longest common subsequence problem and complexities of these algorithms. [6]

Basic search and traversal techniques:

Graph and variants, breadth first search, depth first search, code optimization, topological sorting and complexities of these algorithms. [8]

Backtracking and Branch and bound:

Definitions, 4-queen's problem, estimation of the number of nodes, all and unique solutions of N-queen's problem, graph coloring problem and complexities of these algorithms, LC-search. [6]

NP-Hard and NP-Complete problems :

Non-deterministic algorithm, non-deterministic algorithms for searching, sorting, knapsack problem satisfiability problem and complexities of these algorithms, classes: NP hard and NP Complete. [6]

Reference :

1. E. Horowitz and S Sahni, Fundamentals of Computer Algorithm, Galgotia Publications, 1991.
2. Cormen T.H. *et. al.*, Introduction to Algorithms, Prentice-Hall India, second edition, 2002.
3. Aho, Hopcroft and Ullman, The Design and Analysis of Algorithms, Addison-Wesley Publishing Company, 2000.

Course Code : CS – 102
Title : Advance DBMS

Database System Architectures :

Centralized Database, Client-Server Database, Parallel and Distributed Systems, Server system Architectures, Network types. [10]

Object Oriented & Object Relational Databases :

Concept of Object, Need for complex data types, introduction to object approach and object databases Object oriented data model, Persistent programming languages, Nested relations, Object Relational model, Concept of ODBC & JDBC. [10]

Distributed databases :

Introduction to distributed databases, networks, Design issues, Data distributing, object naming, Distributed query processing, Consistency, Distributed Transactions, Concurrency control, Distributed commitment and recovery, Deadlocks in distributed systems, Security and protections, Homogeneous and Heterogeneous system. [10]

Parallel Databases :

Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism, Design of Parallel Systems, Design Issues. [10]

Advanced Transaction Processing & New Application :

Remote Backup Systems, TP Monitors, Long-Duration Transactions, Real-Time Transaction Systems, Main memory Database, transaction management in multidatabase, Transactional Workflows, Data Mining, Data Warehouding, Information-Retrieval Systems, The World Wide Web, Multimedia Databases. [12]

Reference

1. Henry Korth & Silberschutz, Database System Concepts, Tata MacGraw Hill, (4th Edn).
2. Ramkrishnan, Gehrke, Database Management System, TMH (3rd Edition).

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Course Code : CS – 203
Title : Data Warehousing & Mining

Basics

Decision Support System, Operational versus Analytical Processing. What is a data warehouse ? Source and target data, Granularity, Database gateway, Levels of users. [5]

The decision support life cycle

Life cycles for system development, Issues affecting the decision support life cycle. The decision support life cycle, Phases of the Decision Support Life Cycle (DSLC). [5]

Data Warehouse Design :

<u>Database Schema</u> – Introduction, Starflake Schemas, Identifying Facts and Dimensions, Designing fact tables, Designing the starflake schema, Query redirection, Multidimensional schemas.

<u>Partitioning Strategy</u> – Introduction, Horizontal partitioning, Vertical partitioning.

<u>Aggregations</u> – Introduction, Why aggregate ? What is an aggregation ? Designing Summary tables, Which Summaries to create.

Data Marting – Introduction, When is a data mart appropriate ? Designing data marts, Costs of data marting.

Metadata – Introduction, Data transformation and load, Data management, Query generation, Metadata and tools. [22]

OLAP :

Introduction to OLAP, MOLAP, ROLAP, Difference between MOLAP & ROLAP. [8]

Data mining :

Introduction, Usage, Terms used, Methodology, Data mining technologies and tools, Statistical analysis, applications and challenges, knowledge discovery, general structure of knowledge discovery, application and challenges. [12]

Case Study :

A group of 3-4 students should collect data related to any field and should apply any data mining tool to extract out unseen rules, patterns, associations from that data.

References

1. Vindette Poe, Building a Data warehouse for decision Support, Prentice Hall PTR, ISBN : 0-13-371121-8.
2. Harjinder Gill Prakash Rao, The official Client-Server guide to Data Warehousing, ISBN : 0-7897-0714-4.
3. Sam Anahory, Dennis Murray, Data Warehousing in the Real World, Pearson Education, ISBN . 81-7808-387-6.
4. Claude Seidman, Data Mining with Microsoft SQL Server 2000, Technical Reference, PHI - EEE, ISBN : 81-203-1917-5.
5. Berson, Data Warehousing, Data Minning & OLAP, TMH, ISBN · 0-07-058741-8.

Course Code : CS – 204
Title : Network Programming

Introduction :

LAN with example, Ethernet, WAN with Example, Discussion on Networking devices, Internetworking concept and architectural model. [6]

Internet Addressing :

Internet Addresses, Mapping Internet addresses to Physical Addresses (ARP), Address discovery and binding, Network Interface Layer, RARP. [6]

Design Implementation and Internals :

Internet Protocol, Connectionless Datagram delivery, Routing, IP datagrams, ICMP, global software organization Routing table & routing algorithms, fragmentation & reassembly, multicast processing. [8]

Principles, Protocols and Architecture :

Concept of protocol layering, Advantages, Disadvantages, layered architecture in detail, User Datagram Protocol, TCP-Reliable Stream Transport Service, Data Structures and Input processing, Output processing, Timer Management, Flow Control, adaptive retransmission, urgent data processing. [7]

Client Server Programming and Applications :

The Client Server Model & Software Design, The Socket Interface, Concurrent Processing in client-server software, program interface to protocols, Algorithms & issues in client software design, Example client software, Algorithms & issues in server software design, Iterative, Connectionless Servers, Iterative, Connection Oriented Servers, Concurrent, Connection-oriented Servers, Single-process Concurrent Servers, Multiprotocol Servers, Multiservice Servers, Concurrency in clients, External data representation Remote procedure call concept, RPCgen Concept, Network file system concepts (NFS), DNS, TELNET, DHCP, Electronic Mail (822, SMTP, MIME), discussion on the topic "The future of TCP/IP". [25]

Reference :

1. Douglas E. Commer, Internetworking with TCP/IP-Volume I, Principles, Protocols & Architecture, (3rd Edition), ISBN-81-203-1053-5, PHI.
2. Douglas E. Commer and David L. Stevens, Internetworking with TCP/IP-Volume II, Design Implementation, and Internals, (3rd Edition), ISBN-81-203-0927-8 PHI.
3. Douglas E. Comer, David Stevens, Internetworking with TCP/IP- Vol. III – Client Server Programming and Applications, ISBN- 81-7808-488-0 PHI.

Course Code : CS – 205
Title : Theoretical Computer Science (TCS)

The Theory of 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. [12]

Introduction to Formal Languages :

Basics, Chomsky Classification of Languages, Languages and their Relation, Languages and Automata. [3]

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. [9]

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. [10]

Pushdown Automation (PDA) :
Informal Description, Basic Definitions, Acceptance by a PDA, PDA and CFLs. [6]

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. [6]

Computability :
Basic Concepts, Primitive Recursive Functions, Recursive Functions, Partial Recursive Functions and TM. [6]

References :

1. J.E. Hopcraft, R. Motwani and J.D. Ullman Introduction to Automata Theory, Languages & Computation, Pearson Education Asia, 2003.
2. K.L.P. Mishra, N. Chandrashekharan, Theory of Computer Science, PHI, 2001.
3. Martin John C., Introduction to Language & Theory of Computation (TMH), 2004.

Course Code : CS – Lab. II
Title : **Design and Analysis of Algorithms (DAA)**

Laboratory Assignments:

1 Write a program for searching an element form a given array
2. Write a program for finding maximum element form a given array
3. Write a program for finding binomial coefficient fo two integers defined as B (n,m)=B(n-1, m-1)+B(n-1, m),B(n,n)=B(n,0)=1.
4 Write a program for creating min. and max. heap using INSERT.
5 Write a program for creating min. and max. heap using ADJUST/HEAIFY.
6 Write a program module in a program for finding greatest common divisor of two numbers

7. Write a program for finding maximum, minimum element form a given array.
8. Write a program for searching an element form a given array using binary search for n=1000,2000,3000 find exact time of execution.
9. Write a program for a solution for a knapsack instance.
10. Write a program for sorting elements of arbitrary array in ascending and descending order using heap sort for n=1000,2000,3000 find exact time of execution.
11. Write a program for sorting elements of arbitrary array in ascending and descending order using merge sort for n=1000,2000,3000 find exact time of execution.
12. Write a program for sorting elements of arbitrary array in ascending and descending order using quick sort for n=1000,2000,3000 find exact time of execution.
13. Write a program for multiplying two 2x2 and N x N matrix using Strassen's matrix multiplication algorithm.
14. Write a program for all pair shortest path problem using dynamic programming.
15. Write a program for longest common subsequence problem.
16. Write a program for topological sorting.
17. Write a program for obtaining optimal code for a given expression using CODE1.
18. Write a program for obtaining optimal code for a given expression using CODE2.
19. Write a program for obtaining all solutions of 8 Queens problem using backtracking.
20. Write a program for obtaining only in equivalent solutions of 8 Queens problem- using backtracking.
21. Write a program for UNION, FIND algorithm.
22. Write a program for searching an element form a given array, using rules of removal of recursion.
23. Write a program for finding maximum element form a given array, using rules of removal of recursion.
24. Write a program for finding Binomial coefficient of two integers defined as B (n,m)=B(n-1, m-1)+B(n-1, m), B(n,n)= B(n,0)=1 using rules of removal of recursion.
25. Write a program for Graph coloring algorithm.

Course Code : CS – Lab. IV
Title : Network Programming Lab.

Laboratory Assignments :

(Note : Consider proper application for the implementation of every assignment)

1) Simulate TCP/IP protocol architecture (Also consider ARP, RARP, ICMP… etc).
2) Simulate e-mail server and e-mail clients.
3) Write client & server programs so that client can print the host ID, local port, also client should indicate connection status.
4) Implement the client – server communication using TCP.
5) Implement the client – server communication using UDP.
6) Develop an ECHO server using TCP/UDP.
7) Write a program for ECHO server.
8) Write programs which will demonstrate the implementation of –
   - Iterative Connectionless servers.
   - Iterative Connection oriented servers.
9) Write programs which will demonstrate the implementation of –
   - Concurrent Connectionless servers.
   - Concurrent Connection oriented servers.
10) Write a server program, which will provide telnet services.
11) Demonstrate and implement the file transfer-using FTP.
12) Develop the Chat Client & Server application. A single server should accept the request of multiple clients for intercommunication of clients. Design your own protocols for message passing.
13) Develop a simple web server capable of accepting request from standard clients like IE, Netscape, Opera etc. (Use standard protocol HTTP 1.0 (Ref. www w3c.org)).

Course Code : CS 301
Title : Compiler Construction

Introduction to Compiler :

Translation issues , why to write compiler, compilation process in brief, compiler construction tools, Interpreter and related issues. [2]

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. [4]

Construction of Lexical Analyzer – Automatic construction of Lexical Analyzer (LEX), LEX specification details. [4]

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 – Tree Backous Naur Form, recursive rules, etc., Precedence and associativity, Disambiguous grammar.

Parsing technique - Top down – Recursive decent parser, Predictive or LL (1) parser. Bottom up : - Shift – Reduce, Operator Precedence Parsing, 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]

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. [5]

Intermediate forms of Codes :

Polishnotation, Quadruples, triples, Indirect wipes, Blocks. [8]

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. [8]

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. Dhamdhere 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 : Software Engineering

The Product :

The Evolving Role of Software, Software, Software : A Crisis on the Horizon Software Myths. [2]

The Process :

Software Engineering : A Layered Technology, The Software Process, Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Software Process Models, Component-Based Development, The Formal Methods Model, Fourth Generation Techniques, Process Technology Product and Process. [6]

Analysis Concepts and Principles :

Requirements Analysis, Requirements Elicitation for Software. Analysis, Principles, Software Prototyping, Specification, Specification Review. [6]

Analysis Modeling :

A brief History, The Elements of the Analysis Model, Data Modeling, Functional Modeling and Information Flow, Behavioral Modeling, The Mechanics of Structured Analysis, The Data Dictionary, Other Classical Analysis Methods. [8]

Design Concepts and Principles :

Software Design and Software Engineering, The Design Process, Design Principles, Design Concepts, Effective Modular Design, Design Heuristics for Effective Modularity, The Design Model, Design Documentation. [7]

Architectural Design :

Software Architecture, Data Design, Architectural Styles, Analyzing Alternative Architectural Designs, Mapping Requirements into a Software Architecture, Transform Mapping, Transaction Mapping, Refining the Architectural Design. [7]

User Interface Design :

Elements of good design, Design issues, Features of a modern GUI, Menus, Scrolling, Windows, Icons, Panels, Errors messages, etc. [3]

Software Quality Assurance :

Quality Concepts, The Quality Movement, Software Quality Assuranc:, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Statistical Software Quality Assurance, Software Reliability, Mistake Proofing for ' oftware The ISO 9000 Quality Standards, The SQA Plan [4]

Software Configuration Management :

Software Configuration Management, The SCM Process, Identification of Objects in the Software Configuration, Version Control, Change Control, Configuration Audit, Status Reporting, SCM Standards. [4]

Client/Server Software Engineering :

The Structure of Client/Server Systems, Software Engineering for c/s Systems Analysis Models Issues, Design for c/s Systems, Testing Issues. [3]

Web Engineering

The Attributes of Web-Based Applications, The WebE Process, A Framework for WebE, Formulating/Analyzing Web-Based Systems, Design for Web-Based Applications, Testing Web-Based Applications, Management Issues. [2]

Reference :

1. Software Engineering, a Practitioner's Approach, Roger S. Pressmen, 5th Edition, McGraw Hill International Edition.
2. Ian Somerville, Software Engineering, Pearson Education – Asia, 2002.

Course Code : CS – 303
Title : Internet Computing

.NET Platform and the Web :

Introduction to HTML, Basic and Advanced Tags, CSS, Pathway to Web Applications, Web Client/Server Model, Web Clients and Web Servers, Protocols for Web Client/Server Communication, Server-Side Processing with CGI Programs, Disadvantages of Using CGI, Components of ASP NET and the .NET Framework, Overview of IIS, ISAPI Extensions, ISAPI Filters. [5]

Overview of ASP NET :

Web Forms, Common Language Runtime and Class Library, Managed Components, Web Services, Language Independence in the .NET Framework, COM+ Component Services and .NET [2]

VB.NET :

Data types, Arrays, Functions, Flow Control, Exception handling, Constructors and Destructors, Inheritance, Overridden Functions, Overloading, Polymorphism, Interfaces, Implementing Polymorphism by Using Interfaces, Multithreaded Programming. [3]

ASP.NET :

Features, Anatomy, Code Structure, Execution Stages and State Management, Events Model for the Page Class, Web Forms, IDE Basics, Structure and Configuration of the Global .asax File, HTML Controls, Web Controls, Shared Web Control Properties, Web Controls for Displaying and Formatting Data, Creating Buttons, Inputting Text, Selecting Choices, Creating Lists, Miscellaneous Basic Controls, Rich Controls, Validation Controls, Data List Controls, User Controls, ASP.NET Page Directives. [10]

ASP.NET Intrinsic Objects :

HttpRequest Object, HttpResponse Object, HttpServerUtility Object, HttpApplicationState Object, HttpSessionState Object ObjectContext Object. [5]

Using the .NET Framework Class Library :

Common Features of the .NET Framework Class Library, Using Data Collectio (System.Collections), Handling File Input/Output and Directories (System.IO), Using Binary File I/O with the FileStream Object, Accessing Directory Contents, Watching the File System for Changes (System.IO.FileSystemWatcher), Using the Windows Event Log (System.Diagnostics), Working with Active Directory Services (System.DirectoryServices), Displaying Active Directory Services Contents, Searching Active Directory Services Contents, Modifying Active Directory Services Contents, Using Message Queues (System.Messaging), Communicating with Servers on the Internet (System Web and System Net), HTTP Communication., Sending Internet E-mail (System.Web.Mail). [20]

Accessing Data with ADO.NET :

Overview of Data Access on the Web, ADO, ADO.NET: The Next Generation of Data-Access Technology, ADO.NET Programming Objects and Architecture, NET Managed Data Provider, Displaying Database Data, The IDataReader Interface (System.Data.IDataReader), Working with Command Parameters, Working with the DataSet and DataTable Objects. [7]

References:

1. Crouch, Matt J, Asp.Net and Vb.Net Web Programming, Addison-Wesley, 2002
2. Crouch, Matt J, Web Programming With Asp and Com, Addison-Wesley, 1999
3. Alex Homer, Professional ASP.NET 1.0, 2002, Wrox Publications
4. Chris Goode, Beginning ASP.NET 1.0 with Visual Basic.NET, Wrox Publications, 2002

Course Code : CS – 304
Title : Visual Programming

Windows SDK Programming :

Introduction :

Windows difference, windows Architecture, General structure of writing, windows program Programming Hurdles. [2]

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. [2]

MFC Programming :

Windows, Visual C++ and Application Frameworks Fundamentals.
Microsoft Windows and Visual C++

Windows Programming Model, Visual C++ Components. [3]

The Microsoft Foundation Class Library Application Framework :

Use of Application Framework, Application Framework, MFC Library Message Mapping, Documents & Views. [2]

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. [3]

Basic Event Handling, Mapping Modes and a Scrolling View :

Getting User Input-Message Map Function, Mapping Modes, A Scrolling View Window, Other Windows Messages. [1]

The Graphics Device Interface, Colors and Fonts :

The Device context Classes, GDI Objects, Windows color Mapping, Fonts. [1]

The Modal Dialog and Windows Common Controls :

Modal Vs. Modeless Dialogs, Resources and Controls, Programming a Model Dialog, The Dialog That Are 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. [3]

The Modeless Dialog and Windows common Dialogs :

Modeless Dialogs, Cform View Class, Windows Common Dialogs. [2]

Using ActiveX Controls :

ActiveX Controls Vs. Ordinary Windows Controls, Installing ActiveX Controls, Calendar Control, ActiveX Control Container Programming, ActiveX Controls in HTML Files, Creating ActiveX Controls, Picture properties, Bindable Properties. [4]

Bitmaps :

GDI Bitmaps and Device Independent Bitmaps, Using GDI bitmaps, Using Bitmaps to Screen Display, DIBS and Cdib Class, Putting Bitmaps on Pushbuttons. [3]

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 Works Built - In Items, MFC text Editing Options, Property Sheets, Cmenu Class, Creating Floating Pop-up Menus, Extended Command Processing. [4]

Toolbars and Status Bars :

Control bars and Applications FrameWorks, Toolbars, Tooltips, Locating the Main Frame Window, Status bar. [2]

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 Applications. [4]

Separating the Document From its View :

Document - View Interaction Function, View Application, Cformview Class, Cobject Class, View interaction, Cdocument :: Delete Contents Function, Cobist collection Class. [3]

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. [2]

Reading & Writing documents SDI & MDI Application :

Dynamic Link Libraries

Fundamentals DLL theory, MFC DLL extension Vs regular, A custom control DLL. [2]

MFC program without Document or view Classes :

A Dialog based application, An SDI application, An MDI application. [1]

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. [3]

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. [2]

TCP/IP, Winsock and WinInet :

To Com or Not to Com, Internet Primer, Build your own Internet and Intranet applications, Winsock, Building a Web Server and Client using Chttp Blocking Socket, WinInet Classes, Building a Web Client with the MFC WinInet Classes, Asynchronous Moniker Files. [2]

References :

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.

Course Code : CS – 305
Title : C# Programming

Overview of the Microsoft .NET Platform

Introduction to the .NET Platform, Overview of the .NET Framework, Benefit of the .NET Framework, The .NET Framework Components, Languages in the .NET Framework. [6]

Overview of C#

Structure of a C# Program, Using the Console class of the system namespace to perform basic input/output operations, Recommended Practices Compiling, Running, and Debugging, Handling exceptions in a C# program. [6]

Value-Type Variables

Common Type System, Naming Variables, Using Built-in Data Types, Creating User-Defined Data Types, Converting Data Types. [4]

Statements and Exceptions

Introduction to Statements, Using Selection Statements, Using Iteration Statements, Using Jump Statements, Handling Basic Exceptions, Raising Exceptions. [4]

Methods and Parameters

Using Methods, Using Parameters, Using Overloaded Methods. [2]

Arrays

Overview of Arrays, Creating Arrays, Using Arrays. [2]

Essentials of Object-Oriented Programming

Classes and Objects, Using Encapsulation, C# and Object Orientation. Defining Object-Oriented Systems. [3]

Reference-Type Variables

Using Reference-Type Variables, Using Common Reference Types, The Object Hierarchy, Namespaces in the .NET Framework, Data Conversions. [4]

Creating and Destroying Objects

Using Constructions, Initializing Data, Objects and Memory, Using Destructors Destroying Objects. [3]

Inheritance in C#

Deriving Classes, Implementing Methods, Using Sealed Classes, Using Interfaces, Using Abstract Classes. [3]

Aggregation, Namespaces, and Advanced Scope

Using Internal Classes, Methods, and Data, Using Aggregation, Using Namespaces, Using Modules and Assemblies. [5]

Operators and Events

Introduction to Operators, Operator Overloading, Creating and Using Delegates, Defining and Using Events. [3]

Properties and Indexers

Using Properties, Using Indexers. [2]

Attributes

Overview of Attributes, Defining Custom Attributes, Retrieving Attribute Values. [3]

Miscellaneous Topics

Unsafe Code and Security, C# and Data Handling, Interfacing with COM. [2]

References

1. V.K. Jain, The Complete Guide to C# Programming, Dreamtech Press, 2001, ISBN : 81-7722-12-6.

Course Code : CS – Lab. V
Title : Internet Computing Lab.

Laboratory Assignments :

1) Create a HTML Page(s) to demonstrate use of :
   i) Internal Links
   ii) External Links
   iii) Use of Images
   iv) Various types of lists

2) Create a HTML Page(s) to demonstrate use of :
   i) Logical styles such as bold, italics, emphasis, address, pre-formatted text
   ii) External Links
   iii) Character entity reference characters (any 2)
   iv) Various types of lists.

3) Create HTML Page(s) to demonstrate use of linking using image map. The image map should contain at least 5 images.

4) Create a HTML Page(s) to demonstrate use of :
   i) Animated Images & text
   ii) Scrolling text
   iii) Static background

Paragraph and Divisions

5) Create a HTML page for calendar of the current month. The calendar should contain a Photograph at the beginning. Make use of appropriate colors for dates, advertisement(s) at the bottom.

6) Create a HTML page that shows the year wise statement of sale & revenue, split in to quarterly sale for 5 products of your choices. Page should also contain the logo for the company.

7) Create a HTML page to demonstrate use of frames.
The page should contain appropriate number of frames to demonstrate followings :
Left pane should contain at least 3 shows the names of product. Which when selected should show the information about the products in the right pane. Try to make your pages as appealing and attractive as possible with the use of various formatting elements.
The top pane should contain advertisements the bottom pane should contain a running flash line.

8) Create a HTML page that contains a table with images (at least 9). When clicked on a image it should display the description of the image in the new window. Table should be properly formatted. Images should have tooltips.

9) Design and create a HTML form to signing up for e-mail service. Validate the contents. Display the contents entered by the user.

10) Design and create a HTML form to demonstrate use of various controls. Display the contents entered by the user.

11) Create a HTML page to demonstrate use of frames.
The page should contain appropriate number of frames to demonstrate followings
Left pane should contain at least 3 shows the names of product. Which when selected should show the information about the products in the right pane. Try to make your pages as appealing and attractive as possible with the use of various formatting elements.
The top pane should contain advertisements the bottom pane should contain a running flash line

Course Code : CS – Lab. VI
Title : Visual Programming Lab.

Laboratory Assignments :

Windows Programming :

1. Write a Window program to demonstrate line drawing with right mouse button. The color of line should change with every new line.
2. Write a Window program that display a small rectangle with every left mouse. Click double, clicking on existing rectangle should erase the rectangle.
3. Write a Window program to displaysize 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 create filled rectangle and circles on alternate left click. New figure should not erase the previous one.
5. Write a Window program to create various brushes and change the background color to brushes on each left mouse click.
6. Write a Window program to display the characters entered by user from keyboard. [Consider only alphabets and numbers only].

MFC Programming

1. Create a SDI application to display size of windw & total number of Left clicks, right clicks and double clicks in center of the client area.
2. Create a SDI application that displays a dialog box with two fields viz. User name, password and two push buttons. The dialog box is invoked as the user starts the application. After user presses on 'Ok' button diplay the contents of user name and password in the client area.
3. Create a SDI application, which invokes a dialog box from a menu option. The dialog box has three scroll bars called red scroll, blue scrol, green scroll and a multiline edit box. As the user scrolls through these scroll bars thebackground color of the edit box changes.
4. Create a SDI application that displays a dialog box with five fields : Name, age (spinner control), qualification it has four check boxes for MCA, M. Sc., M. Tech., Ph.D., Radio buttons for sex ,& drop down combo box for designation : System Analyst, Programmer and Project LEADER. As the user fills in this information in the dialog box, display the data entered by the user in the client window. The dialog should be invoked through a menu option called 'Dialog' on main menu bar.
5. Implement a simple note pad that can save, open the text files. It also supports the find and Replace utility.

6 Create a SDI application that invokes a dialog box from a menu called "Dialog" The Dialog has a Track bar (slider control) and a progress bar control. As the user slides through the slider control the progress bar also sets its state accordingly. Display the value of current position set in track bar.

7. Create a SDI application that invokes a dialog box from a menu called "Dialog" The Dialog has a Track bar (slider control) and a spinner control and a progress bar. Slider should slide as the spinner value is changed by the user and vice a versa. Progress bar's state also should be updated.

8. Create a SDI application to create a dialog box. Put a list box & all types of combo boxes on that & demonstrate their use. The selected values should be displayed in the client area of the window.

9. Create a SDI application with following menu options. Display the selected menu time in the client windows the user selects it. Menu items should have check mark' it when selected.

Cricket
|- One Run
|- Four
|- Sixer
|- Out
|- Umpire

Hockey
|- Penalty Corner
| Penalty hit
|- Goal
|- Referee

Football
|- Corner
|- Penalty kick
|- Goal
|- Referee

10 Create a SDI application to create a dialog box with Multi Column List control & Display the student information in different columns. Student information . name, seat no, class, rank should be considered.

11. Create a SDI application with a splitter window, which splits in 2 horizontal panes First pane is a data entry pane for entering movie name, actor, actress, and theatre. As the user enters this information an presses ok it should be displayed in the button pane. Define the underlying document class.

12. Create a SDI application and create a dialog Box with Single column list box & a tree control. List contains family name and tree control contains family hierarchy. As the user selects a family name from list a particular family in the tree control

13. Create a window and show 1>2 push buttons 2>2 check buttons 3>group of 3 radio buttons Display appropriate messages when the user clicks on a button.

13 Write a window program to draw Sine Wave

14. Write a Window program to create a window and display three scroll bars for red, blue and green color. Each having a range from 0 to 255 User can adjust the scroll bo each bar. Get the position of scroll box in each bar and make a color by combin three values and change the background color to the color set by user.

15 Implement a simple editing pad with the help of edit control.

17. Write a program that capture Home, Page Up, Page Down, End & all arrow keys as user presses these keys. Program should display appropriate message in the in the client window.
18. Write a Window program to that contains an edit box; two buttons viz. Add, Remove and a list box. Whenever user enters a string in the edit box and presses the Add button data should be added to the list box and removes the data if 1) it is present in the list 2) presses Remove button at run time.
19. Write a Window program to create a window object with a following menu bar :
20. Write a Window program to create a model dialog box with two fields; user name and password. Once user enters this information display this information in the client window.

Semester – VI
Industrial Training

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