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COURSE CSM-1001: Fundamentals of Information Technology

OBJECTIVES OF THE COURSE
- Obtain understanding of the concepts of Information Technology and its applications.
- Become familiar with the use of Information Technology tools.

NOTE: 1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
  2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT-I   **Introduction to Information Technology:** Basic concepts of IT, Data Processing: Data and Information.

Introduction to Computers: Classification, History, Types of Computers.
Elements of a Computer System: Block Diagram of The Computer System, Introduction to various units.

Hardware: CPU, Memory, Input and Output devices, Auxiliary storage devices.
Software: System and Application Software, Utility packages,
Configuration of Computer System
Applications of Information Technology: Wide range of applications in: Home**,** Education and Training, Entertainment**,** Science, Medicine, Engineering etc.

UNIT-II   **Introduction to Information Technology Tools :**
Operating System, Programming Languages, Features and trends.
Introduction to MS-DOS/WINDOWS/LINUX/UNIX
Office Automation Tools: MS-Office, Word, PowerPoint, Excel, Access,
Working with PC PACKAGES.
Translators: Assembler**,** Compiler and Interpreter.

UNIT-III   **Business Files:** Concept of Character, Field, Record and File.
Types of Data Files: Master File, Transaction File, Archival File.
Keys: Primary Key, Secondary key, foreign key etc.

File Organization: Sequential file, Indexed Sequential file, Random files. Comparison of various type of file organization. Choice of Files Organization, Design of Computer Data Files, Files Security and Back-Up.
A brief Introduction to Database Management Systems (using Access/MySQL)

UNIT-IV   **Computers and Communication:** Introduction to Computer Networks, Internet and World Wide Web, FTP, Electronic Mail.
Web Development Tools: FrontPage, HTML.
Information Security and Integrity: Basic Concepts, Perverse Software, Preventive Measures and treatments.

<u>Laboratory:</u> Working with DOS, Linux/Unix and Windows O.S., MS-Office, Web Design using HTML and FrontPage.

<u>Text Books:</u>
1. Sanders, D.H., "Computer Today ", Mc-Graw Hill, 1988.
2. Suresh K. Basandra, "Computers Today", Galgotia Publications Pvt. Ltd.
3. Microsoft Web Publishing Step by Step, Active Education.
4. Bokhari & Ahmad "UNIX Operating System", Dhanpat Rai & Co.

<u>Reference Books:</u>
1. Raja Raman V., "Fundamental of Computers" (4th edition.), Prentice Hall of India, New Delhi.
2. Trainer T., et al, "Computers", McGraw Hill.
3. Norton, Peter, "Introduction to Computers, Mc-Graw-Hill.
4. B. Ram, "Computer Fundamentals", New Age International Pvt. Ltd.
5. S.Jaiswal, "Fundamental of Computer & IT", Wiley dreamtech. India.

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COURSE   CSM-1002: Programming & Problem Solving Using 'C'

OBJECTIVES OF THE COURSE
- Introduce the fundamental concepts of computer programming.
- Learn to write/debug/execute simple programs in C.

NOTE: 1.   In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2.   Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT-I   Algorithm and its characteristics, flowchart, Algorithm involving Decisions and Loops, Developing Algorithms and Sketching Flowcharts for various problems, problem solving methods. Pseudo code, top down & bottom up approaches of program design.

Introduction and Features of "C" language, Structure of "C" program , Identifiers and Keywords, Constants, Variables, Scope of variables, Typedef, Type Conversion, Arithmetic Operators, Library Functions, Input/Output Statements, getchar(), Putchar(), scanf, printf, Compound statements and block.

UNIT-II   Relational Operators, Logical Operators, Bitwise Operators, Unary Operators, If—Else Statement, ?: Operators, Switch statement, goto statement and Label. Iteration statements: For Loop, While Loop, Do While Loop, Nested Loop, Continue and Break statements.

UNIT-III   Array and Structures: Declaration, Concept of One Dimensional and Multi Dimensional arrays, Defining Structure, Declaration of Structure Variable, Accessing Structure members, nesting of structures, Array of structures, pointers, file handling.

UNIT-IV   Functions: Need of "C" function, User Defined and Library Functions, Prototype of Function, Call by Value, Call by Reference, Nesting of Functions, Recursion, Array as Function Argument, use of pointers with function, Structure as Function Argument. String–Declaration, Initialization and Functions. Command Line Arguments, Storage Classes – Auto, Extern, Static, Register.

Text Books:

1) Paul Deitel, Harrey Deitel, "C-How to Program", Second Edition (2010), Pearson Education, Inc.
2) J. Hanly and E. Koffman. "*Problem Solving and Program Design in C*", Third Edition Update. Addison Wesley, 2002.
3) Isrd , "Programming and Problem Solving Using C Language", Tata Mcgraw Hill

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COURSE CSM-1003: Analysis And Design of Information System (SSAD)

OBJECTIVES OF THE COURSE
- To acquire skills related to analysis and design of Information System using structured systems Analysis and Design Approach.

NOTE: 1.   In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2.   Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT-I   Data, Information, formal Vs informal information, information attributes. System Concept, Information Attributes, Data Operations.

Organization perceived as a System. Information requirements for Organization, Management requirements, Management functions, planning, controlling, decision-making, programmed decision making, non-programmed decision making.

UNIT-II   Overview of Systems Analysis And Design: System Development Life Cycle. Information Sources And Gathering Methods, Interviewing Techniques, Questionnaires, Role And Task of A System Analyst. Attributes of A System Analyst and tools used by S.A.

UNIT-III   Data Flow Diagrams, Feasibility Study And Cost Estimation: Cost-Benefit Analysis, Feasibility Study Report. Making the System Operational: System Implementation, Conversion And Support, System Conversion, User Training, Post Implementation review.

UNIT-IV   Output Design: Objective of output, types of Output, Formats of Output, Designing printed Outputs, Guidelines for designing printed outputs.

Inputs Design: Objective of input design, Capturing data for input, Design of the source document, Methods for data capture, Input Validation.

Laboratory :
1. Designing complete Information System Using SSAD Techniques- Case Studies of I.S.
2. Using CASE Tools for Analysis, Design & Implementation of Information Systems (e.g., Introduction to Visual Case Tools/Rational Rose).

Text Books :

1. Bouch JG And FR Strater : -Information System Theory And Kractice (Santa Barbara : Hamilton)
2. Gaines C & R Sarson : Structure System Analysis Tools And Techniques (Prentice Hall)
3. Lundeberg, Mats, Gonan Gold Et Al : - Information System Development A Systematic Approach
4. Cougher J. D, MA Cotler And RW Knapp : - Advanced System Development And Feasibility Techniques (Wiley New York)
5. V. Rajaraman : - Analysis & Design Of Information System (PHI)
6. Haryszkiewycz, I. T., " Introduction To System, Analysis & Design".
7. Whiten, J.K., Bentley, L. D., Beslow, V. M. "System Analysis & Design Methods".

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COURSE CSM-1004: Digital Logic and Computer Organization

OBJECTIVES OF THE COURSE
- To introduce basics of digital logic circuits design and Computer Organization.

NOTE: 1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT-I   Introduction to Digital Computer, Data Representation, Integer Representation, Boolean Algebra, Simplification of Boolean Expressions, Logic Gates, TTL circuits, Combinational Circuit, Design Procedures, Some commonly used combinational circuits, Binary Adder, Binary Subtractor 2's complement Adder Subtractor, designing with Multiplexers.

UNIT-II   Sequential Circuits, Flip-Flop, RS-FF, JK FF, Master Slave JK FF, D-FF, T-FF, Buffer Register, Shift Register, Ripple counter, Synchronous counter, Controlled Counter, Ring counter.

UNIT-III   Memory Device Characteristics, 2D & 3D Memories, Memory Hierarchy, Semiconductor Memories: RAM, ROM, DRAM, Flash Memory; High Speed Memories: Cache Memory, Associative Memory, Memory Interleaving.

UNIT-IV   Input/Output Interface, I/O Bus and Interface modules, Data transfer modes (Programmed mode, Interrupt initiated I/O, DMA), Interrupt structure, Input-Output Processor (IOP), CPU-IOP Communication, Introduction to advanced computer Architectures, RISC vs CISC Architectures, Types of Parallel processors, Flynn's classification of computer systems, Pipeling, Arithmetic and instruction pipelining, Multiprocessor organizations (Loosely coupled vs Tightly coupled),

Laboratory : Writing Simple Programs for Logic Circuits.

BOOKS :

1. MANO, M.,   Digital Logic and Computer Design.
2. Malvino A.P.   Digital Computer Electronics
3. Bhujade M.R.,   Digital Computer Design Principles
4. Raja Raman V. and Radha Krishnan T., An introduction to digital computer design
5. MANO, M.,   Computer System Architecture
6. Stallings, W.,   Computer Organization & Architecture
7. B. Ram,   Computer System Organization & Architecture

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COURSE CSM-1005: Numerical and Statistical Methods

OBJECTIVES OF THE COURSE
- To develop, debug and document programs for solving numerical & statistical problem.

NOTE: 1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2.   Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT-I   **Floating Point Arithmetic:** Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation.

Computer Arithmetic; Significant Figures, Rounding off, Truncation, Absolute, Relative and Percentage Error, Function of Single And Several Variables, Propagation of Errors in Arithmetic Operations.
Numerical Differentiation & Integration :

Solution of Differential Equations : Taylor Series And Euler's Methods, Modified Euler Method. Runge-Kutta And Predictor-Corrector Methods. Trapezoidal Rules, Simpson's One Third Rule And Simpson's Three Eight Rule, Automatic Error Monitoring, Stability of Solution.

UNIT-II   **Solutions Of Transcendental And Simultaneous Linear Equations :**

Iterative Method : Convergence Of Iterative Methods, Bisection, False Position, Newton-Raphson Methods, Discussion On Convergence Of Solution.

Solution Of Simultaneous Linear Equations : Gauss Elimination Method, Gauss Siedel & Jacob's Iterative Methods, Methods Of Successive Elimination.

UNIT-III   **Interpolation And Approximation :**

Polynomial Interpolation : Newton, Lagranges Etc; Difference Tables, Inverse Interpolation, Polynomial and Curve Fittings, Correlation and Regression: Partial and multiple Correlation (for three variables only), Least square method for curve fitting, multiple regression (three variables only).

Statistical Testing and Estimation Techniques: Properties of good estimator unbiasedness, consistency, sufficiency, completeness, efficiency; Minimum variance unbiased estimators, Cramer Rao Inequality, Method of Maximum likelihood, method of Moments, Confidence Intervals for mean, variance and proportions. Large sample tests for mean and proportion, test for goodness of fit, Tests based on t and F-distributions.

UNIT-IV   **Statistical Computation :**

Basic Statistics : Measure Of Central Tendencies : Mean, Mode, Median: Measure Of Dispersion : - Range, Variance And Standard Deviations; Frequency Distributions And Cumulative Frequency Distributions : Moments And Moment Generating Functions.

Regression Analysis: Linear Regression and Non Linear Regression Algorithm. Linear Correlation Coefficient. Analysis Of Variance, Hypothesis testing for sampling: Small samples, t, z and f tests. Chi-square test. Large samples: Comparison of large samples, testing the significance of the difference between the means of two large samples.

Laboratory : Laboratory Assignment Should Illustrate Problems Encountered Due To Round Off, Truncation And Stability. Students Must Be Able To Analytically Evaluate Library Problems.

Solving Problems Using C: A Graded Sheet Of Numerical & Statistical Problems/Exercise To Be Solved using **SPSS for Data Analysis or MATLAB programming.**

Books :

1. Keter And Prawel - Numerical Methods For Engineering Students.
2. Rajaraman - Computer Oriented Numerical Methods.
3. Shan S. Kuo - Computer Applications of Numerical Methods.
4. Dodes A. - Numerical Analysis For Computer Science.
5. S. Sastry - Introductory Methods of N.A.
6. M. K. Jain And Lyenger - Numerical Methods For Scientific And Engineering Computation.
7. Thomas Richard Macalls - Introduction To Numerical Methods And Fortran Programming.
8. Dr. M. Shanta Kumar - Computer Based Numerical Analysis.
9. S. P. Gupta- Fundamental of Statistics
10. A.M. Goon, M.K. Gupta and T.S. Dasgupta, Fundamentals of Statistics (7th ed.), Vol. I, The World Press Pvt. Ltd., 2000
11. A.M. Goon, M.K. Gupta and T.S. Dasgupta, An Outline of Statistical Theory (2nded.), Vol. II, The World Press Pvt. Ltd., 2000
12. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, 2007
13. S.R. Otto and J.P. Denier, An Introduction to Programming and Numerical Methods in MATLAB, Springer, 2005
14. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation (7th ed.), New Age International Publishers, 2007

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COURSE CSM-1071: Laboratory Course-I

OBJECTIVES OF THE COURSE
- To acquire skills of using Operating Systems (like, DOS/Windows/Linux)
- To learn using PC-Packages
- To learn C programming language

Credit : 04
Sessional Marks : 40
Final Marks : 60

LAB:

Introduction to MS-DOS, UNIX/Linux and Windows Operating System

Using MS-Office (Word, Excel, Power Point & MS-Access)

Developing Web Applications using HTML/FrontPage or Similar Tools.

Developing simple Application Packages using MySQL and HTML

Programming exercise in C (graded sheets of problems)

Programming Exercises in MATLAB

Data Analysis with SPSS

Introduction to PC-Architecture & Trouble Shooting

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COURSE CSM-2001: Algorithms and Data Structures using C++

OBJECTIVES OF THE COURSE

- To introduce basic concepts of C++ language, algorithm analysis, data structures, sorting and searching techniques. The learner will be able to determine which data structures and which sorting and searching techniques are appropriate in various situations during program development and will be able to implement them as classes in C++.

NOTE:
1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT-I **Introduction to C++** : Overview of C++, Data Types, Operators and Expressions, Console I/O, Control Statements, Arrays and Strings, References, Functions, Passing By Value and By Reference, Pointers, Dynamic Memory Allocation, Inline Functions, Default Arguments, Function Overloading, Classes and Objects, Friend Functions, Constructors and Destructors, Class and Function Templates, Implementation of various Data Structures using C++.

UNIT-II **Algorithms, Sorting, Searching, Merging and Recursion:** Problem Analysis, Concept and Proper Properties of Algorithm, Efficiency and Analysis of Algorithm, Sorting and Searching Algorithms, Internal and External Sorting, Merging, Selection sort, Bubble sort, Insertion sort, Merge sort, Heap sort, Quick sort and Radix Sort, Complexities of Sorting and Searching Algorithms, Sorting in Linear Time, Recursive Procedures and Algorithms, Recursion vs iterations, Their Implementation using C++.

UNIT-III **Data Structures :** The Notion of Data Structure, Primitive and Non-Primitive Linear Data Structures, Arrays, Lists, Stacks, Queues, Circular Queues, Priority Queues, Deques, Linked Lists. Representation and Algorithms for Manipulating Linear Data Structures, Polish Notation, Algorithms for Transforming Infix Expression into equivalent Postfix Expression and its Evaluation, Applications of Linear Data Structures.

UNIT-IV   **Non-Linear Data Structures:** Trees, Binary Trees, Operations on Binary Trees, Representation and Manipulation of   Binary Trees, Binary Tree Traversal, Binary Search Trees, Heap, Balancing   Trees,   Graphs and Digraphs, Basic Terminology, Representation and Manipulation of Graphs in Computer, Graph Traversal, Applications of   Non-Linear Data Structures, Elementary Graph Algorithms, Minimum   Spanning Trees, Single-Source Shortest Path, All-Pairs Shortest Paths, Maximum Flow, Hashing.
Advanced Design and Analysis Techniques: Dynamic Programming, Greedy Algorithms, Amortized Analysis. B-Trees, Binomial Heaps and Fibonacci Heaps.

TEXT BOOKS :

1. R.G. Dromey, "How to Solve it by Computer",PHI.
2. Cormen, Rivest and Leiserson, "Introduction to Algorithms", PHI, 2006.
3. Tremblay & Sorenson, "An Introduction to Data Structures with Applications", McGraw Hill.
4. Herbert Schildt, "C++ : A Complete Reference", TMH.
5. Deitel & Deitel, "C++ How to Program", PHI.
6. John R. Hubbard, "Schaum's Outline of Data Structures with C++", TMH.

REFERENCE BOOKS :

1. Knuth, D.E, "Art of Computer Programming, Vol-1", Addison Wesley.
2. J. P. Tremblay and R.B. Bunt, "An Introduction of Computer Science –An Algorithmic Approach", TMH.
3. Robert L. Kruse & A. J. Ryba, "Data Structures and Program Design in C++", Prentice Hall, Inc. NJ, 1998.

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COURSE CSM-2002: Object Oriented Programming using Java

OBJECTIVES OF THE COURSE
- To understand Object Oriented Concepts using Java Language.
- To develop, debug and document programs in Java using OOP paradigms.

NOTE:
1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT-I   Object Oriented Programming: Introduction of OOPS, basics of OOP, fundamental characteristics of OOP, benefits of object oriented programming, applications of OOP, introduction to java, compiling and running java program. Java programming: data types, variable, constants, operators, control statements (if, switch, loops), how to read input from keyboard.

UNIT-II   Objects, classes and methods, Constructing objects, Accessor and mutator methods, object references, Java classes: Abstract classes, static classes, Inner classes, Wrapper classes; Designing classes: Choosing classes, accessors, mutators and immutable classes, side effects, static methods, static field, scope, introduction to strings, string tokenization, methods, method overloading, constructor overloading, use of *this* keyword, use of toString ( ) method, arrays.

UNIT-III   Defining an interface, implementing interfaces, using interfaces for code reusing, converting between class and interface types, using interfaces for callbacks; Polymorphism, Inheritance: Inheritance hierarchies, Inheriting instance fields and methods, Sub class construction, converting between sub class and super class types, cosmic super class, Access control: private access, public access, protected access and package access.

UNIT- IV   Exception handling**:** Importance of exceptions, throwing exceptions, checked and unchecked exceptions, catching exceptions, finally clause. Files and Streams: streams, readers, and writes, reading and writing text files. Applets and Graphics: Why applets, Introduction to HTML, A simple applet, graphical shapes, colors, fonts, drawing complex shapes, reading text input inside applet. AWT: introduction, labels, buttons, check boxes, events etc; Layout manager**:** flow layout, border layout, grid layout, card layout; Menus: Dialog boxes, File dialog; Applet classes, Applet life cycle. Introduction of Java Swing.

Text books:

1) Java Concepts, 5th Edition (John Wiley & Sons, Inc.) by Cay Horstmann.
2) Big Java (John Wiley & Sons, Inc.) by Cay Horstmann.
3) Java, How to Program, 6th Edition (Prentice-Hall) by Deitel and Deitel
4) Java in a Nutshell, 5th Edition (O'Reilly) by David Flanagan

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COURSE CSM-2003: Analysis and Design of Information Systems-(Object Oriented Approach)

OBJECTIVES OF THE COURSE
- To develop understanding about the concepts of Analysis & Design of Information Systems using Object Oriented approach and introducing object modeling tools & techniques.

NOTE:
1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks ₃30
Final Marks : 60

UNIT-I   Introduction : System development life cycle & variations, Approaches to system development, SSAD Vs OOAD, Overview of OOAD methodologies, The Unified Process and its characteristics, Unified Process life cycle, Fundamental concepts of object orientation: object, class, abstraction, encapsulation, inheritance, polymorphism, delegation etc., Model and its purpose, principles of modeling, Object Oriented modeling: Introduction to UML, UML Building Blocks.

UNIT-II   System Analysis (OOA): Capturing, modeling and documenting system requirements, Identifying classes, attributes and operations, Classes and object relationships: Generalization & specialization, Links and associations, aggregation, multiplicity etc, Creating class diagram, Dynamic modeling: Events, States, State transition &scenarios, Modeling dynamic behavior using sequence diagram, collaboration diagram and state chart diagram, Introduction to Activity diagram: Branches, forks, joins, swimlanes etc., Introduction to Use-case modeling: Identifying use-cases, actors, include and extend relationships etc., use-case diagram.

UNIT-III System Design (OOD): Elements of design, Designing application architecture, Design models: Package diagram, Component and Deployment diagram, Design class diagram, Designing Inputs outputs and controls, An overview of Design Patterns: Creational, Structural and Behavioral design patterns.

UNIT-IV   Case study: Library information system, Electricity billing system, Hostel information system, Hospital management system, customer support system etc.

<u>Laboratory</u> :

1. Designing complete Information System Using OOAD Techniques- Case Studies of I.S.

2. Using CASE Tools for Analysis, Design & Implementation of Information Systems (e.g., BOUML/Rational Rose/Visual Case Tools).

<u>References</u> :

1. Booch, G. "*Object Oriented Analysis & Desing*", Addison-Wesley.
2. Rumbaugh, J. et. al. "*Object Oriented Modelling and Design*", PHI.
3. Jacobson, I. et. al. "*Object Oriented Software Engineering*", Addison-Wesley.
4. Kahate, Atul. "*Object Oriented Analysis & Desing*", TMH.
5. Bahrami, Ali. "*Object Oriented System Development*", McGraw Hill.
6. Booch, G., Rumbaugh, J., Jacobson, I. "*The Unified Software Development Process*", Addison-Wesley.
7. Booch, G., Rumbaugh, J., Jacobson, I. "*The Unified Modeling Language User Guide*", Addison-Wesley.
8. Booch, G., Rumbaugh, J., Jacobson, I. "*The Unified Modeling Language Reference Manual*", Addison-Wesley.
9. Martin Fowler, "*UML Distilled*", Addison-Wesley.
10. Larman Craig "*An Introduction to Object Oriented Analysis & Desing*" Prentice Hall.
11. Gamma, E., Helm, R., Johnson, R., Vlissiles, J. "*Design Patterns: Elements of Reusable Object Oriented Software*", Addison-Wesley.
12. Jim Arlow, Ila Neustadt "UML & the Unified Process: Practical Object Oriented Analysis and Design" Addison Wesley.
13. Tom Pender "UML Bible" wiley
14. David A. Taylor "Object Technology : A Manager's Guide
15. Paul Kimmel "UML Demostified" Mc Graw Hill Osborne Media
16. Alan Dennis, Barbara H. Wixom & David Tegarden "System Analysis & Design with UML", Wiley
17. Simon Bennett, Tolin Skelfon, KenUnn "Schaum's Outline of UML" McGraw Hill

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COURSE CSM-2004: Database Management System

OBJECTIVES OF THE COURSE
- To introduce the concept of DBMS.
- To learn SQL using ORACLE.

NOTE: 1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks   : 60

DATABASE MANAGEMENT SYSTEM

UNIT-I   Basic concepts
Database & Database Users
Characteristics of the Database
Database Systems. Concepts & Architecture
Data Models, Schemas & Instances, Sub-schemas, Data Dictionaries
DBMS Architecture & Data Independence
Type of Database Languages, Interfaces, Query Languages
Data Modeling using the Entity-Relationship model
UML, Enhanced Entity-Relationship and Object Modeling
Relational Model, Languages & Systems
Relational Data Model & Relational Algebra
Relational Model Concepts
Relational Model Constraints, integrity constraints
Relational Algebra: relational domain & tuple calculus

UNIT-II   SQL - A Relational Database language (DDL, DML, Views, Embedded SQL)
Data Definition in SQL
View & Queries in SQL
Specifying Constraints & Indexes in SQL
Specifying Constraints & Indexes in SQL
A Relational Database Management Systems
ORACLE
Conventional Data Model & Systems
Network Data Model & IDMS Systems

Membership types & options in a set
DML for the network model
Navigation within a network database
Hierarchical Data Model & IMS System
Hierarchical Database structure
HSAM, HISAM, HDAM & HIDAM organization
DML for hierarchical model
Overview of IMS

UNIT-III   Relational Data Base Design

Function Dependencies & Normalization for Relational Databases
Functional Dependencies, Multi varied & join dependencies
Normal forms based on primary keys
(INF, 2NF, 3NF & BCNF)
Loss less join & Dependency preserving decomposition
Concurrency Control & Recovery Techniques
Concurrency Control Techniques

Locking   Techniques
Time   stamp   ordering
Granularity of Data items
Recovery   Techniques
Recovery concepts
Database backup and recovery from catastrophic failures.

UNIT-IV   Concepts of Object oriented database management systems. Design and Development of Information System using Oracle.

Database Security & Authorization : Introduction to database security issues, discretionary Access control based on granting & revoking privileges, Mandatory Access control & role based Access Control for multilevel security. Introduction to statistical database security, Introduction to flow control, Encryption & Public key infrastructure.

References

1. Date, C.J.,"An Introduction to Database Systems", Narosa Publishing House, New Delhi.
2. Desai, B., "An Introduction to Database Concepts", Galgotia Publications, New Delhi.
3. Elmsari and Navathe,"Fundamentals of Database Systems", Addison Wesley, New Delhi
4. Ullman, J.D.,"Principles of Database Systems", Galgotia Publications, New Delhi
5. Hansen & Hansen "Database Management & Design" (PHI)
6. James Mortin- Principles of Database Management Object Oriented Modeling & Design
7. A. Silberschatz, H. Korth and S. Sudarshan, Database System Concepts (5th ed.),McGraw Hill, 2006
8. R. Ramakrishnan and J. Gehrke, Database Management Systems (3rd ed.),McGraw Hill, 2005
9. Philip Lewis, Arthur Berstein and Michael Kifer, Databases and Transaction Processing and application oriented approach, Addison Wesley, 2002.
10. P. Rob and C. Coronel, Database Systems: Design, Implementation, and Management (7th ed.), Thomson Learning, 2006.
11. S.K. Singh, Database Systems Concepts, Design and Applications, Pearson Education 2006.

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SYLLABUS (IInd-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA)
AND
POST. B.Sc. DIPLOMA IN COMPUTER SCIENCE AND APPLICATIONS (PDCA)

COURSE CSM-2005: Discrete Mathematical Structure

OBJECTIVES OF THE COURSE
- To learn discrete mathematical structures, mathematical logic, graph theory, recurrence relations and growth functions.

NOTE: 1.   In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT-I   **Set Theory:** Review of set theory, Relation and Functions, Boolean algebra.
Mathematical Logic: Predicate Calculus, Inference theory of the predicate calculus. Propositions, connectives, conditional and biconditional, well formed formulas, tautologies, equivalence of formulas, duality law, normal forms, inference theory for propositional calculus.

UNIT-II   **Graph Theory :** Formal definition of graphs, Directed and undirected graphs, Cycles, Chains, Paths, Circuit Connectivity, Eulerian paths and circuits, Hamiltonian paths and circuits Adjacency and incidence matrices, Shortest paths algorithms, Warshall's Algorithms, Trees, Elements of Transport Networks, Flows in Networks. Eulerian paths and circuits, Hamiltonian paths and circuits minimal spanning trees, cut sets, directed graphs, Eulerian paths and circuits, Hamiltonian paths and circuits.

UNIT-III   **Theory of Computation :** Definition of grammar, languages, Chomsky Hierarchy, Finite State Machines, Formal definition of FSM, state transition tables, transition graphs, Mealy and Moore Models, Run of a Machine, Finite automata and regular expressions, Pushdown automata and Turing machine.

UNIT-IV   **Growth of Functions**: Asymptotic notations, monotonicity, comparison of standard functions - floors and ceilings, polynomials, exponentials, logarithms and factorials, summations: summation formulas and properties, bounding summations, approximation by integrals.

Recurrence Relation: Introduction to some common recurrence relations, Solution of Homogenous and Non-Homogeneous finite order linear Recurrence relations using substitution and characteristic roots method. Generating functions, Generating functions for sequences, solutions of recurrence relation using generating function.

BOOKS :

1. Elements of Discrete Mathematics
   By C. L. Liu, Mc Graw-Hill International
2. Discrete Mathematics for Computer Scientists
   By JoY L. Mott., Abraham Kandel, Theodore P. Baker
   Publisher : Reston, A Prentice Hall Company
3. Discrete Mathematical Structures for Computer Science
   By Bernard Kolman and Robert C. Busby, Eastern Economy Edition (PHI)
4. Discrete Mathematics
   By Olympia Nicodemmi, CBS Publication
5. Discrete Mathematical Structures for computer science By Kolman, Busby (PHI)
6. Theory of Computer Science By K.L.P. Mishra and N.Chandrasekaran, (PHI)
7. Discrete Mathematical Structures with Applications to Computer Science By J.P. Tremblay and R. Manohar, (McGraw-Hill)

References:

1. D.E. Knuth "The Art of Computer Programming" (3rd ed.), Vol. 1, Addison Wesley, 1997

2. K.D. Joshi "Foundations of Discrete Mathematics" New Age International Publishers, 2003

3. D.S. Malik and M.K. Sen "Discrete Mathematical Structures: Theory and Applications" Thomson Learning, 2004

4. R.L. Graham, D.E. Knuth, O. Patashnik "Concrete Mathematics" (2nd ed.), Addison-Wesley, 1994.

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SYLLABUS (IInd-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA)
AND
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COURSE CSM-2071 : Laboratory Course-II

OBJECTIVES OF THE COURSE
- To develop, debug and document programs in Java and C++ using OOP paradigms.
- To design and implement database using Oracle.

Credit : 04
Sessional Marks : 40
Final Marks   : 60

LAB:

Programming Exercises in Java/Graded Sheets of problem in Java

Programming Exercises in C++/Graded Sheets of problem in C++

Developing simple Application Packages using Oracle/PL/SQL etc.

References :

1. Java, How to Program, 6th Edition (Prentice-Hall) by Deitel and Deitel
2. Object oriented Programming with C++ : Schaum Series
3. C++ - A complete reference: Herbert Schildt.
4. Oracle and PL/SQL Application Development By Ivan Bayros

Revised on 27.5.2015

SYLLABUS (IIIrd-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA-IInd Year)

COURSE CSM-3001: Operating System

OBJECTIVES OF THE COURSE
- To develop the understanding of functioning of Operating System.

NOTE: 1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT-I   INTRODUCTION Evolution of Operating System, Operating System Structure, types of Operating System: Batch Processing, Multiprogramming, Timesharing, Distributed System, Real Time System.
Process: Concepts, Process control blocks, concurrency, mutual exclusion, semaphores, Interprocess Communication, Process Synchronization.

UNIT-II   Processor management techniques; Threads, Process Scheduling, Scheduling Criteria types of scheduling, scheduling algorithms, Deadlocks, Deadlocks Prevention, Deadlocks Avoidance, Deadlocks Detection.

UNIT-III   Memory Management: Real storage, Contiguous Vs. Non Contiguous storage allocation, Static and Dynamic Partitioned memory allocation; Virtual memory, management of virtual memory, Paging, Segmentations, Segmentation with Paging.

UNIT-IV   I/O Management: Disk Organization, disk space management, disk scheduling, Files types and operations, File access and security, File storage Management, File Organization, Operating System security, Case Study of UNIX/LINUX OS.

BOOKS :
1. An Introduction to Operating System-Harvery M. Deitel
2. An Introduction to Operating System Concepts and Practice-P.C.P.Bhatt
3. Operating System-D.M.Dhamdhere
4. Operating System-J. Archer Harris
5. Modern Operating System- Tanenbaum, A.S.
6. Operating System- William Stallings
7. Operating System Concept-Silberschatz, Galvin, Gagne

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SYLLABUS (IIIrd-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA-IInd Year)

COURSE CSM-3002: Visual Programming

OBJECTIVES OF THE COURSE
- To learn Visual Programming techniques to develop application S/W.

NOTE: 1.   In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2.   Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT-I   **Introduction:** Development in a visual programming environment to develop interactive programs using a graphical user interface, ionic systems and their specifications, message and message passing/events and event-handling in visual programming environment. Introduction to .NET Technology, Software development using Visual Basic .NET.

UNIT-II   **Programming:** Programming with graphics devices, interaction with the user in event based graphical environment, implementation of visual systems, different components and controls of visual system, Elementary data base usage. Visual Basic Fundamentals: The Visual Basic .NET Development Environment, The element of VB.NET, VB.NET operators, Software Design, Conditional Structure and Control Flow, Methods.

UNIT-III   Classes and Objects: Types, Structure and Enumeration, Classes, Interfaces, Exception handling and Classes, Collections, Arrays and other Data Structure. Advance design concepts, Patterns, Roles and Relationships, Advanced Interface Patterns: Adapters and Delegates and Events Data Processing and I/O.

UNIT-IV   Writing Software with Visual Basic .NET, interfacing with the End User, Introduction to ASP.NET and C#.NET and their features.

Project: A programming project involving object oriented design, user interface design and implementation, and coding to support the interface and database linkages, it can be an Internet application in a visual programming environment,

Reference:

1. David I. Schneider, "An Introduction to Programming using Visual Basic 2005" (6th Edition), Pearson Educations Inc. 2007
2. R. Brown, "Visual Basic .NET – Your Visual Blueprint for Building Versatile Programs on the .NET Framework" Wiley Publishing, Inc. 2002
3. Anne Prince, "Murach's Beginning Visual Basic .NET", Murach Publishing, 2003
4. T. Willis, J. Crossland and R. Blair, "Beginning VB.NET 2003", Wrox Publication, 2004
5. Fred Barwell, et. Al., "Professional VB.NET" (2nd Edition), Wrox Publication, 2002
6. Paul Kimmel, "Visual Basic.NET Unleashed", Sams Publishing, 2002
7. Jeffrey R. Shapiro "The Complete Reference Visual Basic .NET" Tata Mcgraw Hill (2002 Edition)
8. Rox "Beginner and Professional Edition VB.NET" Tata Mcgraw Hill.
9. Steven Holzner "Visual Basic.NET Black Book" Wiley Dreamtech Publication.
10. Alex Homer, Dave Sussman "Professional ASP.NET 1.1" Wiley Dreamtech.
11. Bill Evzen, Bill Hollis "Professional VB.NET 2003" Wiley Dreamtech.
12. Tony Gaddis "Starting Out VB.NET PROG 2nd Edition" Wiley Dreamtech.
13. Chris Ullman, Kauffman "Beg. ASP.NET 1.1 with VB.NET 2003" Wiley Dreamtech.
14. Chris Ullman, Kauffman "Beg. ASP.NET 1.1 with VC#.NET 2003" Wiley Dreamtech.

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SYLLABUS (IIIrd-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA-IInd Year)

COURSE CSM-3003: Artificial Intelligence (AI)

OBJECTIVES OF THE COURSE
- To introduce the concepts of Artificial Intelligence.

NOTE:
1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT-I   **Introduction and problem solving**: Natural and Artificial Intelligence, various definitions of artificial intelligence, introduction to artificial intelligence applications.
Issues like- underlying Assumptions about intelligence; Physical Symbol System Hytothesis; its importance in AI. AI Techniques- definition and examples, Criteria of success.

UNIT-II   **Basics of Problem Solving** : Defining control strategies and heuristic search, Problem characteristics; Issues of Direction of search, Topology of search Process, representation of objects, facts and complete problem states; matching; indexing and heuristics functions.
Problem Solving Methods : Generate-and–Test, Hill climbing, Breadth-first search and Best-first search, Problem Reduction, Constraints satisfaction, Means-end analysis. Games playing-Minimax search procedure.

UNIT-III   **Knowledge Representation** : Introduction, need and importance, Representation of facts in propositional and predicate logic, Question-answering and validity Testing, Resolution-clausal form, Basis for resolution, resolution in propositional and predicate logic, examples. Semantic networks, Frame systems and value inheritance, conceptual dependency.
Natural language processing: Parsing techniques, context free grammar, recursive transitions   nets (RTN), Augmented   transitions   nets (ATN), case and   logic grammars, semantic analysis.

UNIT-IV   **Experts System**- Introduction, its applications, various expert system shells with one frame work, knowledge acquisition, case study-MYCIN.
Learning -Definition, Rote Learning, Learning by induction, Explanation based Learning.

Introduction to AI Programming-LISP/PROLOG: Introduction to LISP programming: Syntax and numeric functions, Basic list manipulation functions, predicates and conditionals, input output and local variables, iterative and recursion, property lists and arrays.

Laboratory: AI Application Laboratory
1. Students should learn to use languages such as PROLOG or LISP to solve the laboratory exercises.
2. An expert system shell such as IITM rule be used to create a small expert system for, say, trouble shooting moped, VCR etc. Some suggested experiments are: Tour of India, Stable marriage problem, Game playing (such as bridge), coin change problem etc.

TEXT BOOKS :
1. Elaine Rich : Artificial intelligence-Mc Graw Hill International Book Company, Japan (1983)
2. Charniak, Resibeck & Mcdermott : "Artificial intelligence Programming"-Lawrence Erlbaum associates, Hills dale, NJ (1983)

REFERENCE BOOKS :
1. Nilsson N.J. : Principle of Artificial intelligence,-Tiago Publishing Company, Palo Alto, CA,1980
2. Nilsson N. J.: Problem Solving Methods In Artificial Intelligence; McGraw Hill Book Company, New York (1971).
3. Feigenbaum E.A., J. Feldman (Ed); Computer and Thought- Mc Graw Hill (1963)
4. Winston P.H. - AI-Reading Ma; - Addition Wesley (1999 Edition).
5. Slagle J. R. - Artificial Intelligence; The Heuristic Programming Approach; Mc Graw Hill Book company, New York (1971).
6. Hunt E. B. - artificial Intelligence, academic Press- New York (1995)
7. Ermine-"Expert Systems : Theory and Practice", PHI
8. Jamakiraman Surukesi-"Decision Support System",-PHI-2004
9. Waterman, D.A.-"A Guide to Expert Systems"-Addison Wesley Publishing Company, 1999.
10. Pattarson-"Introduction to Artificial Intelligence and Expert Systems"-PHI, New Delhi. (1990)
11. Narayan A and Sharkey NE-"An Introduction to LISP"-East West Press Pvt., New Delhi-1988.
12. Introduction to PROLOG :- by CLOCK SIN and Mellish (1981)

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<u>**SYLLABUS (IIIrd-SEMESTER)**</u>

<u>**MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA)**</u>

COURSE CSM-3004:   Theory of Computation

<u>**OBJECTIVES OF THE COURSE**</u>:
- Obtain understanding of the concepts of Theory of Computation.
- Obtain understanding of what Computer can do and what can't.

<u>**NOTE**</u>:
1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks   : 60

UNIT-I   **Mathematical Preliminaries and Finite Automat:** Sets, Functions and Relations, Graphs and Trees, Proof Techniques; Languages, Grammars, Finite Automata: Deterministic Finite Automata and Nondeterministic Finite Automata, Equivalence of Deterministic Finite Automata and Non Deterministic Finite Automata, Mealy and Moore Models: Finite Automata with outputs, Procedure for transforming Mealy Machine to Moore Machine and Moore Machine to Mealy Machine; Minimization of Finite Automata.

UNIT-II   **Regular Languages and Regular Grammars:** Regular expressions; Formal Definition of a Regular Expression, Languages associated with regular expressions, Connection between Regular Expression and Regular Languages; Finite Automata and Regular Expression; Regular Grammar; Properties of Regular Languages: Closure properties of Regular languages, Identifying Non-regular languages.

UNIT-III: **Context Free Languages and Pushdown Automata: Context** Free Grammars, Examples of Context Free Languages, Left most and right most Derivations, Derivation Trees, Relation between sentential forms and Derivation Trees; Methods for transforming Grammars; An useful Substitution Rule, Removing useless productions, Removing λ-productions, Removing unit productions; Two important Normal Forms: Chomsky Normal Forms-Greibach Normal Form; Nondeterministic Pushdown Automat: Definition of a Pushdown Automata, The Language Accepted by a Pushdown Automata; Pushdown Automata and Context-Free Languages: Pushdown Automata for Context-Free Languages, Context-Free Grammars for Pushdown Automata; Deterministic Pushdown Automata and Deterministic Context-Free Languages; Grammars

for Deterministic Context-Free Languages; Pumping Lemma for Context-Free Languages; Closure of Context-Free Languages.

UNIT-IV **Turing Machine and their Languages:** The Standard Turing Machine: Definition of a Turing Machine, Turing Machine as Language Accepters; Other Models of the Turing Machine: Multi-tape Turing Machines, Multidimensional Turing Machines, Nondeterministic Turing Machines, The Universal Turing Machine.

BOOKS:

1. Linz, P. An introduction to formal languages and automata. Jones & Bartlett Publishers.
2. Mishra, K.L.P. Theory of Computer Science. PHI
3. Lewis, H. R., & Papadimitriou, C. H. Elements of the Theory of Computation. Prentice Hall PTR
4. Martin, J. C. Introduction to Languages and the Theory of Computation, New York: McGraw-Hill.
5. Sipser, M. (2012). Introduction to the Theory of Computation. Cengage Learning.

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SYLLABUS (IIIrd-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA)

COURSE CSM-3022: Soft Computing

OBJECTIVES OF THE COURSE
- To learn Visual Programming techniques to develop application S/W.

NOTE:
1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT – I **Basic Concepts of Soft computing:** Introduction to soft computing and Hard computing, Hard vs. soft computing, Application of soft computing, Soft computing methods, components of soft computing, Application of soft computing, future of soft computing.

UNIT – II **Neural Networks-1(Introduction & Architecture):** Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.

UNIT – III **Neural Networks-II (Back propagation networks):** Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting back propagation training, applications.

UNIT – IV **Fuzzy Logic and Evolutionary Algorithms:** Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion. Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Genetic Algorithm(GA) : Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

Text Books:

1. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.
2. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press.
3. Siman Haykin,"Neural Netowrks"Prentice Hall of India
4. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
5. Kumar Satish, "Neural Networks" Tata Mc Graw Hill

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SYLLABUS (IIIrd-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA-IInd Year)

COURSE CSM-3023: Computer Graphics

OBJECTIVES OF THE COURSE
- To introduce the concepts of Computer Graphics.

NOTE: 1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT-I   Introduction, fundamentals, Classification of Computer Graphics, Advantages and representative uses of Computer Graphics; Raster Scan and Random Scan, graphics storages, displays processors and character generators, colour display techniques, interactive input/output devices.
Display devices: CRT, Storage tube-DVST Silicon target tube, Plasma panel Laser scan displays, Beam penetration and shadow-mask color displays.

UNIT-II   Graphics primitives, points and lines, Line drawing algorithms, Criteria for good Computer generated lines; Simple DDA and Symmetric DDA; Bresenham algorithm; Generation of other Curves, Circle generators. 2D viewing and clipping, point clipping, line clipping, Cohen Sutherland line clipping algorithm, polygon clipping algorithm of Sutherland and Hodgman, viewing transformations

UNIT-III   2-Dimensional transformations: Translation, Rotation and Scaling. Matrix Formulation of transformations and concatenation. 3D representation, transformations, perspective and parallel projections, spline curves and surfaces, Quadtree and Octree data models for solid objects.
Fractals: Generation, Classification and Dimension. Some basic fractal images- Koch curve, Spearpinski triangle, Mandelbort and Julia sets. Applications

UNIT-IV   A simple Computer Graphics Package; ground rules for Graphics Software Design; Functional Domain-functions sets; graphics primitives, Windowing functions; Miscellaneous utility functions. A graph-plotting program; Display code generator; segmented display file; functions for segmentation, Geometric modeling. Introduction to multimedia, multimedia components, multimedia hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia tools, presentations tools, Authoring tools, presentations.

TEXT BOOKS:

1. Newman W.M. & Sproull R.F. – "Principles of Interactive Computer Graphics"-Mc-Graw Hill Ed. II (1979)

2. Foley J.D. & Van Dam- "Fundamentals of Interactive Computer Graphics". Addison Wesley (1982

Reference Books:

1. Harrington – Computer Graphics-Mc-Graw Hill (1987)
2. Giloi, W. – Interactive Computer Graphics-Data structure and Algorithms Prentice-Hall 1978.
3. Hearn D. & Baker-Computer Graphics-Prentice Hall of India, New Delhi (1990)

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MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA-IInd Year)

COURSE CSM-3071: Laboratory Course-III

OBJECTIVES OF THE COURSE:
- To develop internet applications using Visual Programming techniques.

Credit : 04
Sessional Marks : 40
Final Marks : 60

LAB:

Beside completing the subject/Lab assignments, the students will be required to complete one mini project as follows:

1. MINI-PROJECT in C++ or Java under Linux (UNIX)/Windows

(**In addition to this they will be doing the exercises** provided by the respective teachers in their class rooms. The individual teachers who are teaching the courses will be responsible for completing their respective assignments).

Some of the representative areas/problems may include the following:
- Developing internet applications using recent technologies, using .NET Technology, ASP, Java Servlet, Java Beans, COM, CORBA etc.
- Microprocessor Lab

Books :
1. C+++ by Lafore, Galgotia
2. Visual Basic - By Tech meida Publication 6.0
3. FoxPro 2.5/2.6 - Michal P. Antonowish, Galgotia
4. Oracle 8.0 - By Ivan Bayross; BPB
5. Developer 2K - By Ivan Bayross; BPB
6. Mastering MS-Visual Basic 6.0 Development :
    Microsoft press - WP Publishers & Distributors Pvt., Ltd.
7. Developing user Interfaces for Windows - E.N. Mackay
    -WP Publishers & Distributors Pvt. Ltd.

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SYLLABUS (IVth-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA-IInd Year)

COURSE CSM-4001: Data Communications & Computer Networks

OBJECTIVES OF THE COURSE
- To introduce the basic concepts of Data Communication and Computer Network.

NOTE:
1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks   : 60

UNIT-I   Introduction to Computer Networks: Evolution of Computer Networks**;** Networks goals, uses and applications; Network Hardware and Software; Protocol Hierarchies, Design issues for the Layer; Reference Models: OSI and TCP/IP; Example Networks-Internet, ARPANET, NSFNET; Connection Oriented Networks: X.25, Frame Relay, and ATM.

UNIT-II   Fundamentals of Data Transmission: Data Transmission systems and Operations; Encoding: Standard Encoding Schemes; Line Coding Schemes-Unipolar, Polar and Bipolar; Encoding of Digital Data into Analog Signal-ASK, FSK, PSK, QAM; Encoding of Analog Data into Digital Signals-PCM, DPCM, DM; Encoding Analog Data into Analog Signals-Modulation; Error Detection and Correction Techniques; Multiplexing-TDM, FDM, STDM, WDM, DAM, CDMA; Transmission Media: Magnetic media, Twisted wire-pair, Co-axial Cobler, Fibre optics; Wireless media-Radio and Microwave Transmission; Satellite Communication; Terminal Handling-Polling Techniques; Switching-Message, Circuit and Packet Switching; Serial and Parallel Transmission-Asynchronous and Synchronous Transmission;

UNIT-III Routing Algorithms: Introduction and Classification of R.A.; Properties of R.A.; Optimality Principle; Shortest Path Routing; Multipath (MPA); Centralized Routing; Hot Potato; Flooding; Distributed-Distance Vector Routing; Link State Routing; Routing in Ad Hoc Networks, etc.
Congestion : Congestion Control Algorithms, General Principle of Congestion Control; Congestion Prevention Policies; Congestion Control in Virtual Circuit Subnet and Datagram Subnet; Techniques for achieving good quality of service (QoS). Networks Performance Issues.

UNIT-IV Local Area Networks**:** IEEE-802 Standards**;** Channel Allocation Schemes in LANs and MANs-ALOHA, CSMA; Wireless LAN Protocols-MACA and MACAW; Popular LAN Technologies- Ethernet, Token Ring, ARCNet, ATM LANs etc; Wireless LANs-802.11 Protocol Stack; Broadband Wireless-802.16; Bluetooth; Internetworking-Bridges, Switches, Routers and Gateways; Virtual. LANs.

BOOKS :

1. Tanenbaum, A. S.,   Computer Networks, 4th Edition, PHI, 2003
2. Stallings, W.,   Data and Computer Communication, 8th Edition, PHI, 2007
3. Kurose, J. F., Ross, K.W., Computer Networking, 2nd Edition Pearson Education
4. Forouzan,B.   Data Communications and Networks, 3rd Edition, TMH
5. James Martin,   Satellite Communication System
6. W. Tomasi,   Introduction to Data Communications and Networking, Pearson Education, 2007.

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SYLLABUS (IVth-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA-IInd Year)

COURSE CSM-4002: Internet & Web Technologies

OBJECTIVES OF THE COURSE
- To introduce Web Technologies.
- To develop dynamic websites with advance functionalities.

NOTE:
1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT-I   Internet, Growth of Web, Protocol governing the web, HTTP & URL, Introduction to Cyber laws**,** Cyber Laws in India**,** security aspects in web, business-oriented approach of effective web sites, Introduction to client-server technologies, Distributed Networking technology. Web Pages & Browsers: Types of Web Pages-Static, Dynamic, Active etc., Type of Browsers, Netscape Navigator, Internet Explorer.

UNIT-II   Searching and Downloading Technologies: Introduction, Search Engines, Channels & Channels Push Technology, Pull & Push Models, Introduction to Download Accelerators, How they work, Searching and downloading Techniques. Web Servers & Security: Web & Proxy Server, Setting up of a Proxy Server, The menace in the Internet, Firewalls, Data Security, Data Encryption techniques, SSL, SET.

UNIT-III   Web creation & the Markup Languages: Hypertext & HTML, HTML document feature, Documents structuring Tags in HTML, Special Tags in HTML, Creating Dynamic Webpages using DHTML.
XML: Introduction, Displaying an XML Document, Data Interchange with an XML document, Document type definition, Parsers using XML, XSL, Developing Websites using Frontpage/Dream Weaver, creating animations using FLASH, Introduction to WML & WAP.

UNIT-IV   Dynamic Functionality in Web pages: Common GateWay Interface (CGI), Perl, Java Script, Dynamic page functionality using Java Servlets & JSPs, ASP.NET, ActiveX Controls, Applets,ASPs, Introduction to Middleware Architecture : CORBA, RMI, COM & DCOM, Good web design, the process of web publishing, website hosting.

Text Books:

1. Internet and Web Technology   Raj Kamal, TMH, New Delhi
                                            3rd Edition, PHI
2. Web Technologies   A.S Godbole & A. Kahate, TMH, New Delhi

References :

1. Burdman, "Collaborative Web Development", Addision Wesley.
2. Sharma & Sharma "Developing E-Commerce Sites", Addision Wesley.
3. Ivan Bayross, "Web Technologies Part II", BPB Publications.
4. Shishir Gundavarma, "CGI Programming on the Word Wide Web", O' Reilly & Associate.
5. Don Box, "Essential COM", Addision Wesley.
6. Greg Buczek, " ASP Developer's Guide", TMH

Revised on 27.5.2015

DEPARTMENT OF COMPUTER SCIENCE
ALIGARH MUSLIM UNIVERSITY
ALIGARH, U.P. - 202002

SYLLABUS (IVth-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA-IInd Year)

COURSE CSM-4003: Linux and Shell Programming

OBJECTIVES OF THE COURSE
- To introduce the internals of Linux Operating System.
- To develop, debug and implement Shell Programme.

NOTE:
1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks   : 60

UNIT-I   Importance of Linux/Unix, overview of Linux/Unix operating System, Linux editors: Vi, pico etc; Linux shell, command line structure, essential Linux commands to work in Linux environment, jobs and process management, Linux file system , Linux system calls, Linux process creation and execution, Inter process communication (pipes and signals). IPC using shared memory.

UNIT-II   **Shell programming:**
Need of Shell programming, types of Shells in Linux/Unix, Shell variables**:** User Defined Variables, environment variables, predefined variables, reading values into user defined variables, command substitution computation on shell variable , handling shell variables, passing arguments to the shell, shift command, conditional execution operators, conditional statements , test command, Iterative statements : for, while, until, break, continue statements , practical examples on shell programming. Exercises on shell programming.

UNIT-III   **Linux/Unix Thread Programming:**
What is Threads? Need of threads, types of thread, difference between Thread and process, benefits using Threads, Thread creation and execution**:** creating, terminating; passing arguments to threads, Threads identifiers, joining Threads, detaching/Un-detaching Threads. Thread Synchronization: need of thread synchronization mutex and race conditions, mutex variables, creating and destroying mutexes, Locking/Unlocking mutexes, and uses of mutexes, condition variables, advanced programs for Thread programming.

UNIT-IV   **System administration & security:**
System administration, common administrative tasks, identifying administrative files configuration and log files, role of system administrator, managing user accounts- adding and deleting users, changing permissions and ownerships, creating and managing groups, modifying group attributes, Temporary disable users account, creating and mounting file system, checking and monitoring system performance, file security and permissions, becoming super user using su.

Text books:

a) Neil Matthew, Richard Stones, "Beginning Linux Programming (Linux Programming Series)", Wrox Press.
b) Yashwant Kanitkar, "Unix Shell Programming" , BPB.
c) Ahmad M.I. and Bokhari M.U. "UNIX Operating System" Dhanpat Rai & Co.
d) Parata, "Advanced Unix programming guide", BPB.
e) Sumitabh Das, "Unix Concepts and applications", TMH.
f) Mike Joy, Stephen Jarvis, Michael Luck, "Introducing Unix and Linux", Palgrave Macmillan.

Revised on 27.5.2015

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SYLLABUS (IIIrd-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA-IInd Year)

COURSE CSM-4021: Compiler Construction

OBJECTIVES OF THE COURSE
- To develop the understanding of functioning of compilers and enable to write compilers.

NOTE: 1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks   : 60

UNIT-I   Introduction to assembler, Compiler and linkers, Structure of Compiler, Overview of compilation Process, Compiler writing language, Compiler writing tools .

UNIT-II   Programming Languages and grammar, Context free grammar, Ambiguity and Non ambiguity, Role of Lexical analyzer, Finite automat & regular expressions, Transformation of the grammar, Simple approach to design of lexical analyzer.

UNIT-III   Parsing : Top-down and bottom up approaches, Syntax Directed Translations-Inherited and Synthesized attributes, Dependency graph, Top Down Parsing Implementation, Predictive Topdown Parser, Recursive decent parsing, Table Driver Parser, Bottom up Parsing Implementation, LR Parser, SLR parser.

UNIT-IV   Translation of assignment statement, Boolean expression, Unconditional branching, Conditional branching and looping, Code Optimization-Source of Optimization, Optimization of Basic Blocks, Loops, Error Handling.

BOOKS:
  1. Compiler Construction Principle and Practice -D.M. Dhamdhere, Mcmillan
                                                            India Ltd., Delhi, Bombay, Madras
  2. Compilers-Principle, Techniques& Tools   Aho, Ullman & Sethi, 2003, Pearson Education
  3. Introduction to Compiling Techniques-   J. P. Bennett

Reference Books:

  1. Compiler Design -   O.G. Kakde, Laxmi Pub
  2. System Programming & O.S-   D.M. Dhamdhere, Tata McGraw Hill

Revised on 27.5.2015

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<u>**ALIGARH, U.P. - 202002**</u>

<u>**SYLLABUS (IVth-SEMESTER)**</u>

<u>**MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA II-YEAR)**</u>

COURSE CSM-4022: Optimization Techniques

<u>**OBJECTIVES OF THE COURSE:**</u>
- To introduce the general concept of Optimization Techniques.

<u>**NOTE:**</u>   1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks   : 60

UNIT-I   <u>**Linear Programming**</u>: Introduction, Assumption of linear programming. General linear programming problem. **Simplex Method:** Theory of Simplex method, Computational Procedure, Artificial variable Technique (Big-M' Method), Concept of duality in LP and Dual Simplex Method. **Transportation Problems (TP):** Introduction, The Transportation Tableau, Selection of the Initial Basic Feasible Solution to a TP, U-V Method, Degeneracy in TP, Unbalanced TP. **Assignment Problems** (AP):Introduction, The Assignment Algorithm (Hungarian Method), Unbalanced AP.

UNIT-II   <u>**Project Management and Network Analysis:**</u> An overview of project management and network analysis. Phases of project management Network and basic components. Rules for Network construction Time estimation in Network analysis. Gantt Chart. Critical Path Method and PERT. Algorithm for formulating and solving Critical Path Methods and Program Evaluation and Review Technique.
<u>**Inventory Management :**</u> Introduction, direct & indirect inventories, inventory control, objectives of inventory control, Techniques of inventory control with known demands. Economic lot size problems, fundamental problem of EOQ. Problem of EOQ with finite rate of replenishment. The problem of EOQ with shortage. Multi item deterministic problem, limitation on inventories.

UNIT-III   <u>**Replacement Problems and System Reliability:**</u> Introduction, Types of replacement problem, Replacement Policies for items whose efficiency deteriorates with times. Replacement of items whose maintenance cost increase with time and the value of money also change with time**.** .Replacement policies for items that fail completely. Individual replacement and group replacement policy. Equipments Renewal Problem. Reliability and System Failure Rates; Bath-tub-shaped failure rate. Instantaneous failure rate. Mean Time Between Failure .

UNIT-IV **Dynamic Programming:** Introduction, Multi stage decision processes. Concept of sub-optimization and the principle of optimality. The recursive equation approach. Computational Procedure in dynamic Programming. Conversion of a final value problem into a an initial value, problem.

Simulation: Introduction. Need for Simulation, Types of Simulation Methodology of Simulation. Monte-Carlo Simulation. Generation of Random Numbers Simulation of Queuing System, Simulation of an Inventory System. Simulation of Networks. Advantages and Limitation of Simulation.

<u>**Text Books**</u> **:**

1. Buffa, E. S.	:	Management Science/Operations Research - Model formation, Simulation Methods (Wiley, 1997)
2. Taha A	:	Operation Research (2nd Ed) (University of Arkansas, 1976)
3. Wagner, H.	:	Principle of Operation Research (Prentice Hall). New Jensey, 1969).
4. Kantiswaroop	:	Principle of Operation Research Sultan Chand & Co. Manmohan and Gupta. p162
5. Rao	:	Optimization Theory and application

Revised on 27.5.2015

SYLLABUS (IVth-SEMESTER)
MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA-IInd Year)

COURSE CSM-4025: Information Technology and its Applications (Open Elective)

OBJECTIVES OF THE COURSE

- To introduce the concepts of Computer Graphics.

NOTE:
1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Credit : 04
Sessional Marks : 10
Mid-Sem Marks : 30
Final Marks : 60

UNIT - I   Computer Hardware: Computer System as Information processing System; Computer System Difference- types of Computer Systems, hardware Option- CPU, Input Devices, Output Devices, Storage Devices, Communication Devices, Configuration of Hardware Devices.

UNIT - II   Personal Computer: PC and its main Components, Hardware Configuration, CPU and Clock Speed, Basics of memory, types of memory, cache and registers, RAM and Secondary Storage Devices, memory management, virtual memory Management, Other Peripherals Used With PC, Factor Influencing PC Performance; PC as a virtual Office.

UNIT - III   Modern Information Technology: basic Ideas of local Area Networks (LAN) and Wide Area Networks (WAN); E-mail; Internet technologies, access devices, Concept of a World Wide Web and Internet Browsing; Multimedia.

UNIT - IV   Introduction to Operating System: Software Need, operating System, Application Software, Programming Language; DOS; Window, Window Explorer, print Manager, Control Panel, Paintbrush, Calculator, Desk Top, My Computer, Setting, Find, Run; UNIX.
Applications of Information Technology: Wide range of applications in; home, education and training, Entertainment, Science, medicine, Engineering etc. its applications are; E- judiciary, E-security, E- legislature, Urban and rural development; E- environment, creating secure wireless network for the military.

Text Book:

Bokhari & Kuraishy "Fundamentals of Information Technology", Dhanpat Rai & Co.

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SYLLABUS (IVth-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCA-IInd Year)

COURSE CSM-4071 : Laboratory Course-IV

OBJECTIVES OF THE COURSE
- To learn Linux internals & Shell Programming.
- To design, develop and implement real life application software.

Credit : 04
Sessional Marks : 40
Final Marks : 60

LAB :

Beside completing the subject/Lab assignments, the students will be required to complete one mini project as follows:

1. MINI-PROJECT in RDBMS/Visual Basic/Power builder/D2K

   (**In addition to this they will be doing the exercises** provided by the respective teachers in their class rooms. The individual teachers who are teaching the courses will be responsible for completing their respective assignments).

Some of the representative areas/problems may include the following:

- Designing & Implementing complete information systems using SSAD & OOAD techniques.
- Using CASE tools for analysis, Design & implementation of information systems.
- An expert system shell such as IITM rule be used to create a small expert system for, say, trouble shooting moped, VCR etc. Some suggested experiments are : Tour of India, stable marriage problem, game playing (such as bridge), coin change problem etc.
- To develop Computer programs in C++/C for implementing Computer Graphics algorithms.
- Unix/Linux internals & shell programming.

Books :
1. C+++ by Lafore, Galgotia
2. Visual Basic - By Tech meida Publication 6.0
3. FoxPro 2.5/2.6 - Michal P. Antonowish, Galgotia
4. Oracle 8.0 - By Ivan Bayross; BPB
5. Developer 2K - By Ivan Bayross; BPB
6. Mastering MS-Visual Basic 6.0 Development : Microsoft
     press - WP Publishers & Distributors Pvt.. Ltd.
7. Developing user Interfaces for Windows - E.N. Mackay
     WP Publishers & Distributors Pvt. Ltd.
8. Introduction to PROLOG :- by CLOCK SIN and Mellish (1981)
9. Introduction to LISP :- by Narayan & sharkey (1988), E-West Publications

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DEPARTMENT OF COMPUTER SCIENCE
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SYLLABUS (Vth-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCAIII-YEAR)

COURSE CS-511: TCP/IP Programming

OBJECTIVES OF THE COURSE
- To learn the techniques of internet programming.

NOTE: 1. In all four questions are to be set; at least one from each unit. At least 1/3 more
sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Sessional Marks :   25
Exam Marks   :   75

UNIT-I   Internet working with TCP/IP: Overview of TCP/IP Protocol stack; Network
Interface layer Protocols -ARP, RARP, BOOTP, DHCP, ATMARP; Internet layer-
IP, IP-Addresses -Network and Host IDs, Subnetting, Masking; IP Datagram,
ICMP, IGMP; Overview of Routing in the Internet : RIP – Routing Information
Protocol, OSPF – The Interior Gateway Routing Protocol; BGP – The Exterior
Gateway Routing Protocol; Multicasting.

UNIT-II   Transport Layer : TCP and UDP; Reliable Vrs Unreliable delivering;
Connectionless and Connection-Oriented Data Transfer; Connection Establishment
in TCP; Sliding Window Protocol, TCP Congestion Control, Slow Start
Algorithms; Application Layer Protocols of TCP/IP: Port numbers; Client-Server
Model of Interaction, TELNET, DNS, SMTP; SNMP; FTP; E-Mail; The Future of
TCP/IP; IPv4 Vrs IPv6.

UNIT-III   Introduction to Network Programming: Unix I/O Paradigm and Network I/O;
Adding Networks I/O to Unix; The Socket Abstraction; Creating Socket, Socket
Inheritance & Termination; Specifying a Local Address; Connecting Sockets to
Destination Addresses; Sending and Receiving Data through Sockets; Obtaining
local and remote Socket Addresses; Accessing the Domain name system; Obtaining
Information about Hosts, Networks, Protocol and Services; Client-Server
Programming, Socket Programming with TCP and UDP.

UNIT-IV   Application Development: Design of file transfer protocol, remote log-in protocol
etc. using socket interface. Communication Security- IPsec, Firewalls, VPNs;
Wireless Security-802.11 Security, (WEP), Bluetooth Security, WAP Security.

References:

1. Internetworking with TCP/IP Vol. I,II,&III   By D.E. Comer,3rd Edition, PHI
2. TCP/IP Illustrusted   Vol. I,II,&III   By W. Richard Stevens, Addison Wesley,
3. Network Security-The Complete Reference   Bragg, Rhodes-ously, Strassberg, et.al TMH,
4. Computer Networks   A.S. Tanebaum, 4th Edition, PHI
5. Data Communication and Networks   Forouzan B., 3rd Edition, TMH
6. Adventures in UNIX Network Applications   Programming, Bill Rieken and Lyle Weiman,John Wiley & Sons, 1992.

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SYLLABUS (Vth-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCAIII-YEAR)

COURSE CS-512: E-Commerce

OBJECTIVES OF THE COURSE

- To introduce the concepts of E-Commerce infrastructure & security concerns in E-Commerce.

NOTE: 1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Sessional Marks : 25
Exam Marks : 75

UNIT-I   **Introduction to E-Commerce:**
Fundamental of e-commerce, Brief history of e-commerce, Impact of e-commerce, Benefits and limitations of e-commerce, Classification of e-commerce: Inter organizational e-commerce, Intra organizational e-commerce, Business to Business electronic commerce, Business to Customer electronic commerce and Collaborative commerce, Mobile Commerce etc., Applications of e-commerce technologies, E-Commerce Business models.

UNIT-II   **E-Commerce Infrastructure:**
Framework of e-commerce, I-Way Concept, EC Enablers, Review of the Internet structure, the TCP/IP Protocol Suite, The client/server model, Review of the architectural components of World-Wide Web, Proxy servers, Internet call centers, cookies, Agents in e-commerce and their role, Network infrastructure for e-commerce: Intranets and their applications, Extranets and their applications, Virtual Private Networks (VPNs), Internet-based VPNs, Firewalls and their types

UNIT-III   **Security in E-Commerce:**
Issues in Network and Transaction Security, Cryptography and Cryptanalysis, Symmetric and Public Key Cryptographic systems, Authentication protocols, Public Key Infrastructure (PKI), Integrity and Non-repudiation, Digital Certificates, Digital Signatures, Electronic mail security, Security protocols for web commerce: SSL, SET etc.

UNIT-IV   **Electronic Payments:**
Introduction to Money, The nature of money, Overview of electronic payment systems, Limitations of traditional payment instruments, Electronic payment requirements, Micro payments, Online payment systems, Card-based payment systems.

Reference :-

1. Ravi KalaKota, Andrew Whinston "Frontiers of Electronic Commerce" Addition Wesley
2. Diwan, Sharma "E-Commerce" Excel
3. Asset International "Net Commerce" TMH
4. Bajaj and Nag "E-Commerce: The Cutting Edge of Business" TMH
5. Denlal Amor "The E Business Revolution" Addition Wesley
6. Sokal "From EDI to E-Commerce: A Business Inttiative" TMH
7. Greeanstein and Feinman "E-Commerce" TMH
8. Bharat Bhasker "Electronic Commerce-Framework, Technologies & Applications" TMH
9. K. C. Laudon and C. G. Traver "E-commerce: business, technology, society", Addison Wesley
10. David Whiteley "E-commerce: Strategies, Technologies and Applications", TMH
11. P.T. Joseph, E-Commerce An Indian Perspective, Prentice-Hall of India, 2007
12. Norman Sadeh "M-Commerce : Technologies, Services & Business Module" Wiley
13. O'Malinoy Donalad, M.A. Peirce, Hitesh Tiwari" Electronic Payment Systems for E-Commerce.

Revised on 12.5.2010

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SYLLABUS (Vth-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCAIII-YEAR)

COURSE CS-513 : Software Engineering

OBJECTIVES OF THE COURSE :
- To introduce the methodologies involved in the development and maintenance of software (i.e.) over the entire life cycle.

NOTE: 1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Sessional Marks : 25
Exam Marks : 75

UNIT-I   **Introduction to Software Engineering :** The Evolving role of Software. Software characteristics and applications, Evolution of Software Engineering, Software crisis. The Software Engineering challenges, The Software Engineering approach.

Software Development Life Cycle: Software Development Process Models (Paradigms): Waterfall Model. Prototyping, Iterative Development, Spiral Model.
Software Project: Planning a Software Project. Effort Estimation: (COCOMO and Function Points Model), Project Scheduling, Staffing and Personnel Planning, Software Configuration Management Plan, Quality Assurance Plans, Project Monitoring Plans, Risk Management.

UNIT II   **Software Requirement Analysis and Specification:** Need for SRS, Problem Analysis, Requirements Specification.
Software Design : Design objectives and principles. Module level concepts, Coupling and Cohesion. Design Notations and specifications. Structured Design Methodology, Object Oriented Design.
Detailed Design: Detailed Design, Verification (Design Walkthroughs, Critical Design Review, Consistency Checkers), Metrics.

UNIT-III   **Software Coding:** Programming Principles and Guidelines, Common coding errors, Some Programming Practices, Coding Standards.
Coding Process: Refactoring, Basic Concepts, Modern programming language features. Verification and Validation techniques (Code reading, Static Analysis, Code Inspections or Reviews). Combining different techniques.
Metrics: Size Measures, Complexity Metrics, Style Metrics.
Documentation: Internal and External Documentation.

UNIT-IV   **Software Testing and Maintenance:** Testing Fundamentals: Error, Fault and Failure, Test Oracles, Test Cases and Test Criteria, Psychology of Testing. Testing Objectives and Principles.
Approaches to Software Testing: Black Box and White Box testing.
Black Box Testing: Equivalence Class Partitioning, Boundary Value Analysis, Cause Effect Graphing, Special Cases.
White Box Testing: Mutation Testing, Test Case Generation and Tool Support.
Testing Process: Comparison of Different Techniques, Levels of Testing, Test Plan, Test Case Specifications, Test Case Execution and Analysis.
Software Maintenance, The Road Ahead.

TEXT BOOKS:
1. Pankaj Jalote, An Integrated Approach to Software Engineering (3rd ed.), Narosa Publishing House, 2005.
2. R.S. Pressman, Software Engineering: A Practitioner's Approach (6th ed.), McGraw-Hill, 2006.

REFERENCE BOOKS:
1. Somerville, Software Engineering (6th ed.), Pearson Education, 2004
2. Fairley, R.E. , Software Engineering Concepts, Mc -Graw Hill.
3. K.K. Agarwal and Y. Singh, Software Engineering (revised 2nd ed.), New Age International Publishers, 2006.
4. Douglas Bell, Software Engineering for Students (4th ed.), Addison-Wesley, 2005.
5. Rajib Mall, Fundamentals of Software Engineering (2nd ed.), Prentice-Hall of India, 2006.

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SYLLABUS (Vth-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCAIII-YEAR)

COURSE CS-514: Optimization Techniques

OBJECTIVES OF THE COURSE:
- To introduce the general concept of Optimization Techniques.

NOTE: 1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
2. Laboratory should be an integral part of the course.

Sessional Marks : 25
Exam Marks : 75

UNIT-I Linear Programming: Introduction, Assumption of linear programming. General linear programming problem. **Simplex Method**: Theory of Simplex method, Computational Procedure, Artificial variable Technique (Big-M' Method), Concept of duality in LP and Dual Simplex Method. **Transportation Problems (TP):** Introduction, The Transportation Tableau, Selection of the Initial Basic Feasible Solution to a TP, U-V Method, Degeneracy in TP, Unbalanced TP. **Assignment Problems** (AP):Introduction, The Assignment Algorithm (Hungarian Method), Unbalanced AP.

UNIT-II   Project Management and Network Analysis:
An overview of project management and network analysis. Phases of project management Network and basic components. Rules for Network construction Time estimation in Network analysis. Gantt Chart. Critical Path Method and PERT. Algorithm for formulating and solving Critical Path Methods and Program Evaluation and Review Technique.

Inventory Management :
Introduction, direct & indirect inventories, inventory control, objectives of inventory control, Techniques of inventory control with known demands. Economic lot size problems, fundamental problem of EOQ. Problem of EOQ with finite rate of replenishment. The problem of EOQ with shortage. Multi item deterministic problem, limitation on inventories.

UNIT-III   Replacement Problems and System Reliability :
Introduction, Types of replacement problem, Replacement Policies for items whose efficiency deteriorates with times. Replacement of items whose maintenance cost increase with time and the value of money also change with time**.** .Replacement policies for items that fail completely. Individual replacement and group replacement policy. Equipments Renewal Problem. Reliability and

System Failure Rates; Bath-tub-shaped failure rate. Instantaneous failure rate. Mean Time Between Failure .

UNIT-IV   <u>**Dynamic Programming**</u> :

Introduction, Multi stage decision processes. Concept of sub-optimization and the principle of optimality. The recursive equation approach. Computational Procedure in dynamic Programming. Conversion of a final value problem into a an initial value, problem.

<u>**Simulation:**</u>

Introduction. Need for Simulation, Types of Simulation.Methodology of Simulation. Monte-Carlo Simulation. Generation of Random Numbers. Simulation of Queuing System, Simulation of an Inventory System. Simulation of Networks. Advantages and Limitation of Simulation.

<u>**Text Books**</u> **:**

     1. Buffa, E. S.   :   Management Science/Operations Research - Model
                         formation, Simulation Methods (Wiley, 1997)
     2. Taha A   :   Operation Research (2nd Ed) (University of Arkansas,
                         1976)
     3. Wagner, H.   :   Principle of Operation Research (Prentice Hall). New
                         Jensey, 1969).
     4. Kantiswaroop   :   Principle of Operation Research Sultan Chand & Co.
                         Manmohan and Gupta. p162
     5. Rao   :   Optimization Theory and application

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SYLLABUS (Vth-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCAIII-YEAR)

COURSE CS-515: Accounting and Financial Management

OBJECTIVES OF THE COURSE
  * To introduce the basic accounting procedures and financial management processes. It also focuses on the computerized implementation of these accounting concepts.

NOTE: 1. In all four questions are to be set; at least one from each unit. At least 1/3 more sections are to be set for choice within each unit.
   2. Laboratory should be an integral part of the course.

Sessional Marks : 25
Exam Marks   : 75

UNIT-I INTRODUCTION

   a) Justification of the subject in overall package of courses. Overview of Accounting using Computers.
   b) Definition and objectives of Accounting, Accounting Equation, Basic Accounting Terms.
   c) Theory Base of Accounting– Generally Accepted Accounting Principles (GAAP), Dual Aspect of Accounting.
   d) Basic Accounting Process, Classification of Accounts, Rules for recording the business transactions, Preparation of Journal and Ledger, Subsidiary Books.
   e) Trial Balance: Objectives and Methods of preparing the Trial Balance, Types of Errors, Rectification of Errors, Suspense Account.

UNIT-II FINANCIAL STATEMENTS AND THEIR ANALYSIS

   a) Financial Statements: Preparation of Trading A/C, Profit & Loss A/C and Balance sheet (Sole Proprietorship only).
   b) Ratio Analysis: Significance, Uses, Limitations and Classification of Accounting Ratios.
   c) Profitability Ratios
   d) Activity Ratios
   e) Solvency Ratios.
   f) Capital Structure Ratios.
   g) Practical Problems.

UNIT-III COSTING

    a) Costing as a Decision-Making tool for the Management.

    b) Marginal and Absorption Costing, Application of Marginal Costing including simple problems on Make or Buy and Product-Mix.

    c) Cost, Volume and Profit (C-V-P) Analysis: Uses and Limitation of Break-Even Analysis, Determination of Break-Even Point, Profit-Volume (PV) Ratio, Margin of Safety, Practical Problems.

    d) Standard Costing and Variance Analysis.

    e) Computerized Standard Costing.

UNIT-IV FINANCIAL MANAGEMENT

    a) Concept of Funds and relevant Inflow & Out flow.

    b) Effect of Taxes and Estimation of Inflow.

    c) Capital Budgeting, Methods of Long-term Investment Project Appraisal: Traditional Techniques, Discounted Cash-Flow or Time-Adjusted Techniques, Present Value Concept.

    d) Payback Period, Average Rate of Return (ARR), Present Value (PV), Net Present Value (NPV), Internal Rate of Return (IRR) Methods, Profitability Index etc., Practical Problems.

    e) Budgeting, Types of Budgets, Cash Budget, Preparation of Cash Budget, Simple Practical Problems.

Text Books :

1. P.C. Tulsian, "Financial Accounting", Pearson Education.
2. Dr. R. K. Sharma & Dr. R. S. Popli, "Financial Accounting", Kitab Mahal.
3. Khan & Jain, "Financial Management", Tata Mc GrawHill.
4. Khan & Jain, "Management Accounting", Tata Mc GrawHill.

Reference Books :

1. I.M. Pandey, "Financial Management", Vikas Publication House.
2. Charles T. Horngren, "Introduction to Management Accounting",Pearson Education.
3. Prof. Nafees Baig, "Cost Account and Cost Control", Rajat Publications.

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SYLLABUS (Vth-SEMESTER)

MASTER OF COMPUTER SCIENCE AND APPLICATION (MCAIII-YEAR)

COURSE CS-572 : Laboratory Course-V

OBJECTIVES OF THE COURSE
- To design, develop and implement real life application programming using advanced internet techniques.

<div align="right">

Sessional Marks   :   50
Exam Marks   :   50

</div>

LAB :

Beside completing the subject/Lab assignments, the students are required to complete one mini project as follows:

1. MINI-PROJECT using Web Engineering Tools: Design and Implementation of Website, Web Applications, Web Services etc. Students are required to incorporate the followings:

    Dynamic Pages, Adding Dynamic Functionality
    Interactive User Interface
    Database in the back-end
    XML and Databases
    Provision for EDIs
    Adding Security Features, etc.

For developing the project, students many use the followings:

    .NET Platform, J2EE Platform;
     Microsoft Front page/Flash/PHP/Dreamweaver etc.
     XML, DHTML, CGI, Scripting Languages (VB-, Java-), Java, ASP, or Suitable Technologies.

In addition to this Mini Project students will be doing the exercises provided by the respective teachers in their class rooms. The individual teachers who are teaching the courses will be responsible for completing their respective assignments.

Some of the representative areas/problems may include the following:

- TCP/IP Programming
- Working with the popular Accounting package e.g. Tally, Ex-Gen etc. and learning Art of making entries, generating various reports like Profit-Loss account, Balance Sheet etc.
- Developing simple accounting Packages e.g., accounts payable, Account receivable etc., in VB, FoxPro or Oracle (D2K) etc.

- Study, Analysis and Design of complete information systems
- Also, Students should learn languages such as PROLOG or LISP to solve the Laboratory exercises.
- To develop Computer programs in C++/C for the following and to test with suitable numerical examples.

  - ➢ Programming Replacement Problems
  - ➢ M/M/I queuing system
  - ➢ Single item deterministic inventory model problems with/without shortage and finite/infinite production rate.
  - ➢ To draw the PERT/CPM Networks.
  - ➢ Calculation of PERT/CPM analysis.
  - ➢ Simulating simple problems

  I.   Graphical method to solve two dimensional linear Programming Problem
  II.   Revised Simplex method to solve n-dimensional linear programming problem
  III. Dual simplex method to solve n-dimensional linear programming problems
  IV.   Solution of Transportation problem
  V.   and M/M/I queuing system
  VI.   Single item deterministic inventory model problems with/without shortage and finite/infinite production rate.
  VII. To draw the PERT/CPM Networks.
  VIII. Calculation of PERT/CPM analysis.

Individual teachers are responsible for assignments related to their theory classes.

Revised on 12.5.2010