UNIVERSITY OF MADRAS
INSTITUTE OF DISTANCE EDUCATION
MCA
Under Choice Based Credits System
(With effect from the academic year 2018-2019)

SCHEME OF EXAMINATION

SEMESTER I / COURSE COMPONENT	SUBJECTS	CREDIT	MAX MARKS		TOTAL
			INT	EXT	
Core Paper-I	Programming in C and C ++	4	20	80	100
Core Paper-II	Digital Computer Fundamentals	4	20	80	100
Core Paper-III	Open Source Software	4	20	80	100
Core Paper-IV	Practical – I: Programming in C and C ++ Lab	2	40	60	100
Core Paper-V	Practical – II: Open Source Software Lab	2	40	60	100
Elective-I	Mathematics for Computer Science	3	20	80	100

SEMESTER II / COURSE COMPONENT	SUBJECTS	CREDIT	MAX MARKS		TOTAL
			INT	EXT	
Core Paper-VI	Data Structures	4	20	80	100
Core Paper-VII	Programming in Java	4	20	80	100
Core Paper-VIII	System Software	4	20	80	100
Core Paper-IX	Practical – III: Data Structures using C ++ Lab	2	40	60	100
Core Paper--X	Practical – IV: Programming in Java Lab	2	40	60	100
Elective-II	Statistical Methods	3	20	80	100

SEMESTER III / COURSE COMPONENT	SUBJECTS	CREDIT	MAX MARKS		TOTAL
			INT	EXT	
Core Paper-XI	Design and Analysis of Algorithms	4	20	80	100
Core Paper-XII	Computer Graphics	4	20	80	100
Core Paper-XIII	Advanced Java Programming	4	20	80	100
Core Paper-XIV	Operating Systems	4	20	80	100
Core Paper-XV	Practical – V: Advanced Java Programming Lab	2	40	60	100
Core Paper-XVI	Practical - VI: Operating Systems and Computer Graphics Lab	2	40	60	100
Elective-III	Accounting & Financial Management	3	20	80	100

SEMESTER IV COURSE COMPONENT	SUBJECTS	CREDIT	MAX MARKS INT	 EXT	TOTAL
Core Paper-XVII	Computer Networks	4	20	80	100
Core Paper-XVIII	Database Management Systems	4	20	80	100
Core Paper- XIX	Software Engineering	4	20	80	100
Core Paper-XX	Multimedia Systems	4	20	80	100
Core Paper-XXI	Practical – VII: RDBMS Lab	2	40	60	100
Core Paper-XXII	Practical – VIII: Multimedia Systems Lab	2	40	60	100
Elective-IV	Information Security	3	20	80	100

SEMESTER V COURSE COMPONENT	SUBJECTS	CREDIT	MAX MARKS INT	 EXT	TOTAL
Core Paper- XXIII	Object Oriented Analysis and Design	4	20	80	100
Core Paper- XXIV	Web Based Application Development	4	20	80	100
Core Paper-XXV	Practical – IX: Web Based Application Development Lab	2	40	60	100
Core Paper- XXVI	Practical – X: Mini Project	2	40	60	100
Elective -V	Big Data Analytics	3	20	80	100
Elective - VI	Artificial Neural Networks	3	20	80	100

SEMESTER VI COURSE COMPONENT	SUBJECTS	CREDIT	MAX MARKS INT	 EXT	TOTAL
Core Paper-XXVII	Project & viva-voce	16	20	60+20	100

CREDIT DISTRIBUTION

		CREDITS
Core Paper	16 X 4	64
Core Practical	10X 2	20
Elective	6 X 3	18
Project	1 X 16	16
TOTAL		**118**

MASTER OF COMPUTER APPLICATIONS
Under Choice Based Credits System
(With effect from the academic year 2018-2019)
REVISED SYLLABUS

SEMESTER – I

Title of the Course/ Paper	**Programming in C and C++**		
Core Paper - I	I Year & First Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of programming in C & C++		

Unit 1: Basic Elements of C – Data Types – Operator – Control Statements – Branching, Looping, Nested Control Structures – Prototypes and Functions – Parameter Passing Methods – Recursion – Storage Classes – Library Functions – Arrays – Passing Arrays to Functions – Multi-Dimensional Arrays – Strings Operations – Enumerated Data Types.

Unit-2: Structures –User Defined Data Types – Union - Nested Structure, Passing Structures to Functions – Pointer Concept – Declaration – Accessing Variable through Pointer – Initializing Pointer Variable – Pointers and Functions – Pointers and Arrays – Pointers and Structures – Example Programs using Pointers with Function, Arrays and Structures – Command Line Arguments – Self Referential Structures. File Handling - File Pointer – High Level File Operations – Opening and Closing of File – Creating, Processing and Updation on Files – Simple File Handling Programs.

Unit 3: Introduction to OOP – Overview of C++ - Classes – Structures – Union – Friend Functions – Friend Classes – Inline functions – Constructors – Destructors – Static Members – Scope Resolution Operator – Passing objects to functions – Function returning objects. Arrays – Pointers – this pointer – References – Dynamic memory Allocation – functions Overloading – Default arguments – Overloading Constructors – Pointers to Functions – Ambiguity in function overloading.

Unit 4: Operator Overloading – Members Operator Function – Friend Operator Function – Overloading some special operators like [ ] , ( ) , a and comma operator – Inheritance – Types of Inheritance – Protected members – Virtual base Class – Polymorphism – Virtual functions – Pure virtual functions. Class templates and generic classes – Function templates and generic functions – Overloading function templates – power of templates

Unit 5: Exception Handling – Derived class Exception – overhandling generic functions – Exception handling Functions – terminate () unexpected () – Uncaught – exception () Streams – Formatted I/O with ios class functions and manipulators – creating own manipulator – overloading << and >> - File I/O – Name spaces – conversion functions – Array based I/O .

Recommended Texts:

1) B. W. Kernighan and D. M. Ritchie, 1990, The C Programming Language, Second Edition, PHI, New Delhi.
2) H. Schildt, 2003, C++ The Complete Reference, 4th Edition, Tata McGraw-Hill, New Delhi.

Reference Books:

(1) A. N. Kanthane, 2005, Programming with ANSI and Turbo C, Pearson Education, Delhi.

(2) J. R. Hanly and E. B. Koffman, 2005, Problem solving and program design in C, Fourth Edition, Pearson Education India.

(3) J.P. Cohoon and J.W. Davidson, 1999, C++ Program Design – An Introduction to Programming and Object-oriented Design, 2nd Edition, Tata McGraw-Hill, New Delhi.

(4) Johnston, 2002, C++ programming today, PHI, New Delhi.

(5) A. N Kanthane, 2005, Object Oriented Programming with ANSI & Turbo C++ , Pearson Education, New Delhi.

(6) Farrel , 2001, Object Oriented Programming using C++ , 2 nd Edition, Thomson Learning, Singa[pore.

Website and e-Learning Source:

http://www.cs.cf.ac.uk/Dave/C/CE.html

http://www.doc.ic.ac.uk/~wjk/C++Intro/

http://www.fredosaurus.com/notes-cpp/oop-classes/oop.html

Title of the Course/ Paper	**Digital Computer Fundamentals**		
Core Paper–II	**I Year & First Semester**	Credit: 4	
Objective of the course	This course introduces the basic concepts of programming in Digital Computer Fundamentals.		

Unit 1 : Number System – Converting numbers from one base to another – Complements – Binary Codes – Integrated Circuits – Boolean algebra – Properties of Boolean algebra – Boolean functions – Canonical and Standard forms – Logical Operations – Logic gates – Karnaugh Map up to 6 variables – Don't Care Condition – Sum of Products and Products of Sum simplification – Tabulation Method.

Unit-2 : Adder – Subtractor – Code Converter – Analyzing a combinational Circuit – Multilevel NAND and NOR circuits – Properties of XOR and equivalence functions – Binary Parallel Adder – Decimal Adder – Magnitude Comparator – Decoders – Multiplexers – ROM – PLA.

Unit 3 : Flip Flops – Triggering of flip-flops – Analyzing a sequential circuit – State reduction – excitation tables – Design of sequential circuits – Counters – Design with state equation – Registers – Shift Registers – Ripple and synchronous Counters.

Unit-4 : Memory Unit – Processor Organization - Bus Organization – Scratch Pad memory – ALU – Design of ALU – Status Register – Effects of Output carry – Design of Shifter – Processor Unit – Microprogramming – Design of specific Arithmetic Circuits

Unit-5 : Accumulator – Design of Accumulator – Computer Design – System of Configuration – Instruction and Data formats – Instruction sets – Timing and Control – Execution of Instruction – Design of Computer – Hardwired control – PLA Control and Microprogram control

Recommended Texts:

1) M. Morris Mano, 2011, Digital Logic and Computer Design, Thirteenth Impression, Pearson Education, Delhi

Reference Books:

1) M. M. Mano and C.R.Kime, 2001, Logic and Computer Design Fundamentals, 2nd Edition, Pearson Education, Delhi.
2) Givone, 2002, Digital Principles Design, Tata McGraw Hill, New Delhi.
3) C. H. Roth , Jr, 2005, Fundamentals of Logic Design ,5 th Edition, Thomson Learning, Singapore.

Title of the Course/ Paper	**Open Source Software**		
Core Paper-III	I Year & First Semester	Credit: 4	
Objective of the course	This course introduces the concepts of Open Source Software.		

Unit 1 : Introduction : Open Source – Open Source vs. Commercial Software – Introduction to Linux **-** Linux Distributions - Operating Systems and Linux - Open Source Software - Software Repositories - Third-Party Linux Software Repositories - Linux Office and Database Software - Internet Servers - Development Resources - Online Linux Information Sources - Install Issues - accessing Your Linux System - The Display Managers: GDM and KDM - Switching Users -Accessing Linux from the Command Line Interface- Command Line Interface - Help Resources - Context-Sensitive Help - Application Documentation -The Man Pages - The Info Pages - Software Repositories.

Unit-2: The Shell **-** The Command Line - History - Filename Expansion: *, ?, [ ] - Standard Input/Output and Redirection - Pipes - Redirecting and Piping the Standard Error: >&, 2> - Jobs: Background, Kills, and Interruptions - Ending Processes: ps and kill - The C Shell: Command Line Editing and History - The TCSH Shell - The Z-shell

Unit 3: The Shell Scripts and Programming **-** Shell Variables - Shell Scripts - User-Defined Commands - Environment Variables and Subshells: export and setenv - Conditional Control Structures - Linux Files, Directories, and Archives- Linux Files - The File Structure - Listing, Displaying, and Printing File - Managing Directories - File and Directory Operations - Archiving and Compressing Files – vi editor

Unit 4: PHP – Create and run PHP page – Mixing PHP and HTML – Printing text and HTML – Echo – Here – Command Line PHP – Comments – Variables – Strings – Constants – Data types – Operators and flow control.

Unit 5: String and Array – String functions – Convert and format string – Arrays – Creating function – Reading data in web pages.

Recommended Texts:

1) R. Peterson , 2007, Linux: The Complete Reference, Sixth Edition, TMH
2) S. Holzner, 2008, PHP: The Complete Reference, TMH

Reference Book:

1) R. Stones, N. Mattew, 2011, Beginning Linux Programming, 4th Edition, Wiley India Pvt. Ltd.-New Delhi
2) R. Nixon, Learning PHP, MySQL, JavaScript, and CSS, 2012, 2nd Edition, O'Reilly Media.

Title of the Course/ Paper	**Practical – I: Programming in C and C++ Lab**		
Core Paper-IV	I Year & First Semester	Credit: 2	
Objective of the course	This course gives training to program in C & data structure implementation.		

C Lab:

1. String manipulation
2. Matrix multiplication
3. Finding determinant of a matrix
4. Euclidean's algorithm for finding gcd (towers of honai).
5. Implement insertion sort algorithm using pointers
6. Creating database for telephone numbers and related operations. Use file concepts.

C++ Lab:

1. Write a C++ program to calculate income tax using default arguments.
   Write a C++ program to categorize employees based on designation using static data members.
2. Write a C++ program to add two private data members using friend functions.
3. Write a C++ program to implement matrix vector multiplication using friend functions.
4. Write a C++ program to manipulate complex numbers using operator overloading and type conversions.
5. Write a C++ program to perform matrix addition and subtraction using dynamic memory allocation.
6. Write a C++ program to perform calculate student marks by overloading new and delete operators.
7. Write a C++ program to develop a template for linked list class and its methods.
8. Develop with suitable hierarchy classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application to Demonstrate dynamic polymorphism and RTTI.

Title of the Course/ Paper	Practical – II: Open Source Software Lab		
Core Paper V	I Year & First Semester	Credit: 2	
Objective of the course	This course gives training to program in shell & PHP.		

1) Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions

2) Write a shell program to simulate
   a. **'cat'** command
   b. **'wc'** command to count the number of lines and number of words in the given input file.

3) Write a grep command that
   a. Count the number blank lines in the file1
   b. Select the lines from the file1 that have the string 'LINUX'.

4) Write a sed command that
   a. Print lines numbers of lines beginning with "O"
   b. Swap the first and second word in each line in the file

5) Write an awk script to
   a. Count the number of lines in a file that do not contain vowels.
   b. Find the number of characters, words and lines in a file.
6) Write a shell script to find out whether the given number is prime number or not
7) Write a shell program to find out factorial of the given number
8) Write a shell program to find out reverse string of the given string and check the given string is palindrome or not
9) Write a shell script to search an element in the list
10) Write a shell script to implement menu driven program to display list of users who are currently working in the system, copying files (cp command), rename a file, list of files in the directory and quit option.(Hint: use case structure)

PHP:

11) Display strings and variables with the echo command
12) Display strings and variables with the print command
13) Create a simple HTML form and accept the user name and display the name through echo command.
14) Write a PHP script, which change the color of first character of a word.
15) Write a PHP script, which will return the following components of the url
    Write a PHP script to
    i. get the first element of an array.
    ii. insert a new item in an array on any position.
    iii. sort an array
    iv. merge two arrays.
16) Write a program to calculate and print the factorial of a number
17) Write a PHP program to generate and display the first n lines of a Floyd triangle.

18) Write a PHP script to
    i. transform a string to all uppercase letters.
    ii. transform a string to all lowercase letters.
    iii. reverse a string
    iv. count lines in a file.
19) Write a PHP script to
    a. print the current date
    b. calculate the difference between two dates.
    c. calculate number of days between two dates.

Title of the Course/ Paper	**Mathematics for Computer Science**		
Elective –I	I Year & First Semester	Credit: 3	
Objective of the course	This course introduces the basic concepts of Mathematics for Computer Science.		

Unit 1: Mathematical Logic**:** Statement Calculus – Connectives – normal forms – Predicate Calculus – Theory of inference for statement Calculus – Predicate Calculus including theory of inference.

Unit-2: Set Theory: Basic concepts of set theory – relations and ordering – functions – recursion.

Unit 3: Algebraic Structures: Semigroups – monoids- grammars and languages – groups and subgroups – Polish experiments and their compilation.

Unit-4: Roots of Equations: Graphical Method – Bisection Method – False-Position Method – Fixed-Point Iteration – Newton-Raphson Method – Secant Method – Roots of Polynomials: Conventional Methods – Muller's Method – Bairstow's Method. Algebraic Equations: Gauss Elimination –Gauss-Jordan – LU Decomposition – Matrix Inverse –Gauss-Seidel.

Unit-5 : Numerical Differentiation - Integration: Trapezoidal Rule – Simpson's Rule – Romberg Integration – Differential equations: Taylor's method – Euler's method –Runge-Kutta 2^{nd} and 4^{th} order methods – Predictor – corrector methods.

1. Recommended Texts :

(i) J.P. Tremblay and R. Manohar, 1975, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill, New Delhi

(ii) S.S. Sastri, 1977, Introductory Methods of Numerical Analysis, Prentice Hall India, New Delhi

2. Reference Books:

(i) J. Truss, 1999, Discrete Mathematics for Computer Scientists, 2^{nd} Edn., Addison Wesley, Boston.

(ii) S. C. Chapra and R. P.Canale, 2002, Numerical Methods for Engineers, Fourth Edition, McGraw Hill International Edition.

(iii) Kolman, Busby and Ross, 2005, Discrete mathematical structures, 5^{th} edition, PHI, New Delhi.

SEMESTER – II

Title of the Course/ Paper	**Data Structures**		
Core Paper-VI	I Year & Second Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of programming in Data Structures.		

Unit 1: Abstract data types - asymptotic notations – complexity analysis – Arrays-representation of arrays – operations on arrays – ordered lists – polynomials.

Unit-2: Linked lists: Singly linked list- circular linked lists - doubly linked lists – general lists – stacks -queues - circular queues – Evaluation of expressions.

Unit 3: Trees – Binary Trees – Binary Tree Traversals – Binary Tree Representations – Binary Search Trees – Threaded Binary Trees – Application of Trees (Sets) – Representation of Graphs – Graph Implementation – Graph Traversals- Application of Graph Traversals-Minimum Cost Spanning Trees – Shortest Path Problem

Unit 4: Internal Sorting – Optimal Sorting Time – Sorting Large Objects – Sorting with Tapes- Sorting with Disks.

Unit 5: Hashing – AVL Trees - Red-Black Trees – Splay Trees – B-Trees.

Recommended Texts:

1) E.Horowitz, S. Sahni and Mehta, 1999, Fundamentals of Data Structures in C++, Galgotia, New Delhi
2) S. Sahni, 2001, Data structures, Algorithms & Applications, Tata McGraw-Hill, New Delhi.

Reference Books:

1) G. L. Heileman, 1996, Data Structures, Algorithms and Object Oriented Programming, Tata McGraw-Hill, New Delhi.
2) A.V.Aho, J.D. Ullman, J.E. Hopcraft, 1983, Data Structures and Algorithms, Addison Wesley, Boston.
3) Yedidyah Langsam Augensteil, Tanenbaum, Data Structures using C and C++ , PHI, New Delhi
4) Gilberg , Forouzan, 2002, Data Structures,Thomson Asia, Singapore.

Title of the Course/ Paper	**Programming in Java**		
Core Paper – VII	I Year & Second Semester	Credit: 4	
Objective of the course	This course is to develop programming skills in Java.		

Unit 1: Introduction to Java - Features of Java - Object Oriented Concepts - Lexical Issues - Data Types - Variables - Arrays - Operators - Control Statements. Classes - Objects - Constructors - Overloading method - Access Control - Static and fixed methods – Nested Classes-Inner Classes - String Class - Inheritance - Overriding methods - Using super-Abstract class.

Unit 2: Packages - Access Protection - Importing Packages - Interfaces - Exception Handling Throw and Throws – Multithreaded Programming-Thread Model- Thread Priorities-Synchronization - Messaging - Runnable Interface - Inter thread Communication - Deadlock - Suspending, Resuming and stopping threads – Using Multithreading.

Unit 3: I/O Streams – Byte and character streams – Reading Console Input- Writing Console Output- String Handling- String Buffer- Simple Type Wrappers- Java Utilities.

Unit 4: Networks basics - Socket Programming – Reserved Sockets-Proxy Servers - TCP/IP Sockets - Net Address - URL - Datagrams – Inet Address.

Unit 5: Applets – Event Handling – Working with Windows, Graphics and Text using AWT Classes – AWT Controls – Layout Managers – Menus – User Interface Components with Swings: Controls, Menus, Dialog Boxes – JDBC Connectivity.

Recommended Texts :

1) H. Schildt, 2002, Java2 (The Complete Reference), Fifth Edition, McGraw-Hill.
2) C. S. Horstmann, G. Cornell, 2011, Core Java , Volume I- Fundamentals, Eighth Edition, Pearson Education, Delhi.

Reference Books:

1) H.M. Deital and P.J. Deital, 2005, Java: How to program, 5th Edition, Pearson Education, Delhi.

Title of the Course/ Paper	**System Software**		
Core Paper – VIII	I Year & Second Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of System Software.		

Unit 1: Unit 1: Language processors – Language processing activities and fundamentals – Language specification – Development Tools – Data Structures for Language processing- Scanners and Parsers.

Unit-2: Unit 2: Assemblers: Elements of Assembly language programming - Overview of the Assembly process - Design of a Two-pass Assembler - A single pass Assembler for the IBM PC.

Unit 3: Macros and Macro processors – Macro definition, call , and expansion – Nested macro calls – Advanced macro facilities - Design of a macro preprocessor - Compilers: Aspects of compilation .

Unit 4: Compilers and Interpreters – Memory allocation - Compilation of Expressions and Control structures - Code optimization – Interpreters.

Unit 5: Unit 5 : Linkers: Linking and Relocation concepts – Design of a linker – Self relocating Programs – A linker for MS DOS - Linking for overlays – loaders - Software tools: Software tools for program development - Editors - Debug monitors - Programming environments – User interfaces.

Recommended Texts:

1) D. M. Dhamdhere, 1999, Systems Programming and Operating Systems, Second Revised Edition, Tata McGraw-Hill, New Delhi.

Reference Books:

1) L.L.Beck,1996,System Software An Introduction to System Programming, 3rd edition, Addison-Wesley.

Title of the Course/ Paper	**Practical – III: Data Structures using C++ Lab**		
Core Paper-IX	I Year & Second Semester	Credit: 2	
Objective of the course	This course gives practical training in programming in C++ using Data Structures.		

1. Implementation of Arrays (Single and Multi-Dimensional)
2. Polynomial Object and necessary overloaded operators.
3. Singly Linked Lists.
4. Circular Linked Lists.
5. Doubly Linked Lists.
6. General Lists.
7. Implementation of Stack (using Arrays)
8. Implementation of Queue (Using Pointers)

9. Implementation of Circular Queue (using Arrays and Pointers)
10. Conversion of Infix to Postfix
11. Evaluation of Expressions
12. Binary Tree Traversals using recursion.
13. Binary Search Trees – Insertion and Deletion
14. Shortest path (Dijkstra's)
15. Search methods in graphs (DFS & BFS) using recursion.

Title of the Course/ Paper	**Practical – IV: Programming in Java Lab**		
Core Paper -X	I Year & Second Semester	Credit: 2	
Objective of the course	This course gives practical training in programming in Java.		

APPLICATION:

1. Generating random numbers using Random Class.
2. Implementation of Point Class for Image manipulation.
3. Usage of Calendar Class and manipulation.
4. String Manipulation using Char Array.
5. Database Creation for storing e-mail addresses and manipulation.
6. Usage of Vector Classes.
7. Implementing Thread based applications & Exception Handling (Synchronization & asynchronization).

APPLETS:

8. Working with Frames and various controls.
9. Working with Dialogs and Menus.
10. Working with Panel and Layout.
11. Incorporating Graphics (Scaling Only).
12. Create a payroll application using Swings.

APPLICATION FOR EVENTS HANDLING:

13. Application Using JDBC Connectivity

Title of the Course/ Paper	**Statistical Methods**		
Elective –II	I Year & Second Semester	Credit: 3	
Objective of the course	This course introduces the basic concepts of Statistical Methods.		

Unit 1:

Sample spaces - events - Axiomatic approach to probability - conditional probability - Independent events – Bayes' formula - Random Variables - Continuous and Discrete random variables - distribution function of a random variable - Characteristics of distributions - Expectation, variance - coefficient of variation, moment generation function - Chebyshev's inequality

Unit 2:
Bivariate distribution - conditional and marginal distributions - Discrete distributions - discrete uniform, Binomial Poisson and geometric Distributions - Continuous distributions - Uniform, Normal, Exponential and Gamma distributions.

Unit 3:
Correlation coefficient - Rank correlation, coefficient of determination - Linear Regression - Method of Least squares - Fitting of the curve of the form $ax + b$, $ax^2 + bx + c$, ab^x and ax^b- multiple and partial correlation (3 - variables only).

Unit 4:
Concept of sampling – Methods of sampling - simple random sampling - Systematic sampling and stratified random sampling (descriptions only) - concepts of sampling distributions and standard error - point estimation (concepts only) - Interval Estimation of mean and proportion. Tests of Hypotheses - Critical Region - two types of Errors - Level of significance - power of the test - Large sample tests for mean and proportion - Exact tests based on Normal, t, F and Chi-square distributions.

Unit 5 :
Basic principles of experimentation - Analysis of variance - one way and two way classifications - completely randomized design - Randomized Block design - Time series Analysis - Measurement of Trend and Seasonal variations.

1. Recommended Texts:

(i) Mood, A.M., Graybill, F. and Boes, 1974, Introduction to Mathematical Statistics, McGraw-Hill.

(ii) Trivedi, K.S, 1994, Probability and Statistics with Reliability, Queuing and Computer Science Applications. Prentice Hall India, New Delhi.

2. Reference Books:

(i) Arnold O. Allen, 1978, Probability, Statistics and Queuing Theory with Computer Science Application.

(ii) Bajpai, A.C. Calus, I.M. Fairley, J.A., 1979, Statistical Methods for Engineers and Scientists. John Wiley & Sons.

(iii) Doughlas, C.,Montagomery, Lynwood,A. & Johnson, 1976, Forecasting and Time Series Analysis, Tata McGraw-Hill, New Delhi.

(iv) Baisnab, A.P. and Manoranjan Jas, 1993, Elements of Probability and Statistics, Tata McGraw-Hill, New Delhi.

(v) Kossack, C.F. and Hensschkec, C.I., Introduction to Statistics and Computer Programming, Tata McGraw-Hill, New Delhi.

SEMESTER – III

Title of the Course/ Paper	**Design and Analysis of Algorithms**		
Core Paper-XI	II Year & Third Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of Design and Analysis of Algorithms.		

Unit 1: Introduction - Definition of Algorithm – pseudocode conventions – recursive algorithms – time and space complexity –big-"oh" notation – practical complexities – randomized algorithms – repeated element – primality testing **-** Divide and Conquer: General Method - Finding maximum and minimum – merge sort.

Unit-2: Divide and conquer contd. – Quicksort, Selection, Strassen's matrix multiplication – Greedy Method: General Method –knapsack problem - Tree vertex splitting - Job sequencing with dead lines – optimal storage on tapes.

Unit 3: Dynamic Programming: General Method - multistage graphs – all pairs shortest paths – single source shortest paths - String Editing – 0/1 knapsack.Search techniques for graphs – DFS-BFS-connected components – biconnected components.

Unit 4: Back Tracking: General Method – 8-queens - Sum of subsets - Graph Coloring – Hamiltonian cycles. Branch and Bound: General Method - Traveling Salesperson problem.

Unit 5: Lower Bound Theory: Comparison trees - Oracles and advisory arguments - Lower bounds through reduction - Basic Concepts of NP-Hard and NP-Complete problems.

Recommended Texts:

1) E. Horowitz, S. Sahni and S. Rajasekaran, 2008, Computer Algorithms, 2nd Edition, Universities Press, India.

Reference Books

1) G. Brassard and P. Bratley, 1997, Fundamentals of Algorithms, PHI, New Delhi.
2) A.V. Aho, J.E. Hopcroft, J.D. Ullmann, 1974, The Design and Analysis of Computer Algorithms, Addison Wesley, Boston.
3) S.E.Goodman and S.T.Hedetniemi, 1977, Introduction to the Design and Analysis of algorithms, Tata McGraw Hill Int. Edn, New Delhi.

E-learning resources:

1) http://www.cise.ufl.edu/~raj/BOOK.html

Title of the Course/ Paper	**Computer Graphics**		
Core Paper-XII	II Year & Third Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of Computer Graphics which shall be useful for virtual modeling.		

Unit 1: Introduction to computer Graphics – Video display devices – Raster Scan Systems – Random Scan Systems - Interactive input devices – Hard Copy devices - Graphics software –Area fill attributes – Character attributes inquiry function - Output primitives – line drawing algorithms – initializing lines – line function – Circle Generating algorithms – Ellipse Generating algorithms - Attributes of output primitives – line attributes – Color and Grayscale style.

Unit 2: – Two dimensional transformation – Basic transformation – Matrix representation and Homogeneous co-ordinates - Composite transformation – Matrix representation – other transformations – two dimensional viewing – window – to- viewport co-ordinate transformation.

Unit 3: Clipping algorithms – Point clipping -line clipping - polygon clipping – Curve clipping - text clipping – Exterior clipping –– Three dimensional transformations – translation- rotation- scaling – composite-shears and reflections - Three dimensional viewing – Projection – Orthogonal and oblique parallel projections.

Unit 4:– Viewing - perspective projection – Three dimensional clipping algorithms- Visible surface detection methods –– backface detection, depth buffer, A-buffer, scan-line, depth sorting, BSP-tree, area subdivision, octree and other methods.

Unit 5 : Computer Animation - Three dimensional object representations – Spline representation - Bezier curves and surfaces – B-Spline curves and surfaces –– Color models and color applications.

Recommended Text:

1) D. Hearn, M.P. Baker, and W.R. Carithers, 2011 – Computer Graphics with open GL, 4th Edition, Pearson Education

Reference Books:

1) W.M. Neumann and R. F. Sproull, Principles of Interactive Computer Graphics, Tata McGraw-Hill, New Delhi.
2) S. Harrington, 1989, Fundamentals of Computer Graphics, Tata McGraw-Hill, New Delhi.
3) D. F. Rogers, J. A. Adams, 2002, Mathematical elements for Computer Graphics, 2nd Edition, Tata McGraw-Hill, New Delhi.
4) D. F. Rogers, 2001, Procedural elements for Computer Graphics, 2nd Edition, Tata McGraw-Hill, New Delhi.
5) Foley, Van Dan, Feiner, Hughes, 2000, Computer Graphics, Addison Wesley, Boston

Website and E-Learning Source:

1) http://forum.jntuworld.com/showthread.php?3846-Computer-Graphics- Notes-All-8-Units
2) http://www.cs.kent.edu/~farrell/cg05/lectures/index.html

Title of the Course/ Paper	**Advanced Java Programming**		
Core Paper-XIII	II Year & Third Semester	Credit: 4	
Objective of the course	This course gives an insight into advanced features of Java.		

Unit 1: Servlet Overview – Servlet life cycle - The Java Web Server – Simple Servlet – Servlet Packages – Using Cookies - - Session Tracking - Security Issues – using JDBC in Servlets – HTML to Servlet Communication - applet to servlet communication.

Unit 2: Java Beans: The software component assembly model- The java bean development kit- developing beans – notable beans – using infobus - Glasgow developments - Application Builder tool- JAR files-Introspection-Bound Properties-Persistence-customizers - java beans API.

Unit 3: EJB: EJB architecture- EJB requirements – design and implementation – EJB session beans- EJB entity beans-EJB Clients – deployment tips, tricks and traps for building distributed and other systems – implementation and future directions of EJB-Variable in perl-perl control structures and operators – functions and scope

Unit 4: RMI – Overview – Developing applications with RMI: Declaring & Implementing remote interfaces-stubs & skeletons, Registering remote objects, writing RMI clients – Pushing data from RMI Servlet – RMI over Inter-ORB Protocol

Unit 5: JSP –Introduction JSP-Examining MVC and JSP -JSP scripting elements & directives-Working with variables scopes-Error Pages - using Java Beans in JSP Working with Java Mail-Understanding Protocols in Java mail-Components-Java mail API-Integrating into J2EE-Understanding Java Messaging Services-Introducing Java Transactions.

Recommended Text:

1) James McGovern, Rahim , Adatia, Yakor Fain, 2003, J2EE 1.4 Bible, Wiley-dreamtech India Pvt. Ltd, New Delhi
2) Herbert Schildt, 2002, Java 2 Complete Reference, 5th Edition, Tata McGraw Hill, New Delhi.
3) Jamie Jaworski, 1999, Java 2 Platform – Unleashed, First Edition, Techmedia-SAMS.

Reference books:

1) K. Moss, 1999, Java Servlets, Second edition, Tata McGraw Hill, New Delhi.
2) D. R.Callaway,1999, Inside Servlets, Addison Wesley, Boston
3) Joseph O'Neil, 1998, Java Beans from the Ground Up, Tata McGraw Hill, New Delhi.
4) TomValesky, Enterprise JavaBeans, Addison Wesley.
5) Cay S Horstmann & Gary Cornell, Core Java Vol II Advanced Features, Addison Wesley.

Title of the Course/ Paper	Operating Systems		
Core Paper-XIV	II Year & Third Semester	Credit: 4	
Objective of the course	This course introduces the fundamental concepts of operating Systems with case studied on Unix and Windows.		

Unit 1: Defining a Operating System - Clustered Systems - Operating-System Structure - Operating-System Operations - Process Management - Memory Management - Storage Management - Protection and Security - Computing Environments - Open-Source Operating Systems - Operating system services - System Calls - Types of System Calls - System Programs - Operating-System Structure - System Boot.

Unit-2: Process Management: Process concept – Process Scheduling - Operations on Processes - Interprocess Communication - Communication in Client – Server Systems - Threads - Multithreading Models - Basic Concepts – Scheduling Criteria – Scheduling Algorithms - Process Synchronization - Critical section Problem - Peterson's Solution - Synchronization hardware – Semaphores, classical problem of synchronization – System model - Deadlock Characterization - Methods for Handling Deadlocks - Prevention, Avoidance, and Detection – Recovery.

Unit 3: Storage management – Background- Swapping - Contiguous Memory Allocation - Paging - Structure of the Page Table - Segmentation - virtual memory background - demand paging - Copy-on-Write - page replacement and algorithms -

Unit 4: Storage management – File system - File concept - access methods - directory and directory structure - - protection - File-System Structure - File-System Implementation - Directory Implementation - Allocation Methods - Free-Space Management - Secondary Storage structure - disk structure – disk attachment - Disk scheduling

Unit 5: Protection - Goals of Protection - Principles of Protection - Access Matrix - Security - The Security Problem - Program Threats - System and Network Threats - User Authentication – Implementing security defenses - Firewalling to Protect Systems and Networks - Computer-Security Classifications.

Recommended Texts:

1) A. Silberschatz P.B. Galvin, G.Gagne, 2012, Operating System Concepts, 8th Edn., John Wiley & Sons, Inc.

Reference Books

1) D.M. Dhamdhare , 2012, Operating Systems: A Concept Based Approach, 3rd Edn.Tata McGraw-Hill, New Delhi.
2) A.S. Tanenbaum, H. Bos ,2014, Modern Operating Systems, 4th Edn, Prentice-Hall of India, New Delhi.

Website and e-Learning Source

1) http://iit.qau.edu.pk/books/OS_8th_Edition.pdf

Title of the Course/ Paper	**Practical – V: Advanced Java Programming Lab**		
Core Paper-XV	II Year & Third Semester	Credit: 2	
Objective of the course	This course gives practical training in Advanced java programming.		

1. HTML to Servlet Applications
2. Applet to Servlet Communication
3. Designing online applications with JSP
4. Creating JSP program using JavaBeans
5. Working with Enterprise JavaBeans
6. Performing Java Database Connectivity.
7. Creating Web services with RMI.
8. Creating and Sending Email with Java
9. Building web applications

Title of the Course/ Paper	**Practical – VI: Operating System and Computer Graphics Lab**		
Core Paper – XVI	II Year & Third Semester	Credit: 2	
Objective of the course	This course gives practical training in Operating System and Computer Graphics.		

Operating System Lab

1. Inter Process Communication (IPC) using Message Queues.
2. Implementations of wait and signal using counting semaphores.
3. Atomic Counter update problem.
4. Signaling processes.
5. Deadlock detection (for processes passing messages)
6. Process Scheduling: FCFS
7. Process Scheduling: Round Robin.
8. Two Process Mutual Exclusion.

Computer Graphics Lab:

1. Program to draw a line using DDA algorithm.
2. Program to draw a circle using Bresenham's algorithm.
3. Program to implement the Polygon clipping alogorithm.
4. Program to implement the Text clipping algorithm.
5. Program to implement the 2D Translation, 2D Rotation and 2D scaling.
6. Program to implement the 3D Translation, 3D Rotation and 3D scaling.
7. Program to implement the Shearing and Reflection of an object.

Title of the Course/ Paper	Accounting & Financial Management		
Elective III	II Year & Third Semester	Credit: 3	
Objective of the course	This course introduces the basic concepts of Accounting & Financial Management.		

Unit 1: Principles of Accounting: Principles of double entry -Assets and Liabilities - Accounting records and systems - Trial balance and preparation of financial statements - Trading, Manufacturing, Profit and Loss accounts, Balance Sheet including adjustments(Simple problems only).

Unit 2: Analysis and Interpreting Accounts and Financial Statements: Ratio analysis - Use of ratios in interpreting the final accounts (trading accounts and loss a/c and balance sheet) - final accounts to ratios as well as ratios to final accounts.

Unit 3: Break-even analysis and Marginal Costing: Meaning of variable cost and fixed cost - Cost-Volume-Profit analysis – calculation of breakeven point, Profit planning, sales planning and other decision – making analysis involving break - even analysis - Computer Accounting and algorithm.(differential cost analysis to be omitted)

Unit 4: Budget/Forecasting: preparation of and Characteristics of functional budgets, Production, sales, Purchases, cash and flexible budgets.

Unit 5 : Project Appraisal: Method of capital investment decision making: Payback method , ARR method - Discounted cash flows - Net Present values - Internal rate of return - Sensitivity analysis - Cost of capital.

1. Reference Books:

(i) Shukla M.C. & T.S. Grewal, 1991, Advanced Accounts, S.Chand & Co. New Delhi.

(ii) Gupta R.L. & M. Radhaswamy, 1991, Advanced Accounts Vol. II, Sultan Chand & Sons, New Delhi.

(iii) Man Mohan & S.N. Goyal, 1987, Principles of Management Accounting, Arya Sahithya Bhawan.

(iv) Kuchhal, S.C., 1980, Financial Management, Chaitanya, Allahabad.

(v) Hingorani, N.L. & Ramanthan, A.R, 1992, Management Accounting, 5th edition, Sultan Chand, New Delhi.

SEMESTER – IV

Title of the Course/ Paper	**Computer Networks**		
Core Paper - XVII	II Year & Fourth Semester	Credit: 4	
Objective of the course	This course gives an insight into various network models and the general network design issues and related algorithms.		

Unit 1: Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, 3G Mobile phone networks, Wireless LANs –RFID and sensor networks - Physical layer – Theoretical basis for data communication - guided transmission media

Unit-2: Wireless transmission - Communication Satellites – Digital modulation and multiplexing - Telephones network structure – local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction.

Unit 3: Elementary data link protocols - sliding window protocols – Example Data Link protocols – Packet over SONET, ADSL - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols.

Unit 4: Network layer - design issues - Routing algorithms - Congestion control algorithms – Quality of Service – Network layer of Internet- IP protocol – IP Address – Internet Control Protocol.

Unit 5: Transport layer – transport service- Elements of transport protocol - Addressing, Establishing & Releasing a connection – Error control, flow control, multiplexing and crash recovery - Internet Transport Protocol – TCP - Network Security: Cryptography.

Recommended Texts:

1) A. S. Tanenbaum, 2011, Computer Networks, Fifth Edition, Pearson Education, Inc.

Reference Books:

1) B. Forouzan, 1998, Introduction to Data Communications in Networking, Tata McGraw Hill, New Delhi.
2) F. Halsall, 1995, Data Communications, Computer Networks and Open Systems, Addison Wessley.
3) D. Bertsekas and R. Gallagher, 1992, Data Networks, Prentice hall of India, New Delhi.
4) Lamarca, 2002, Communication Networks, Tata McGraw Hill, New Delhi.

Website, E-learning resources:

1) http://peasonhighered.com/tanenbaum

Title of the Course/ Paper	Database Management System		
Core Paper-XVIII	II Year & Fourth Semester	Credit: 4	
Objective of the course	This course introduces the concepts of database systems design.		

Unit 1: Introduction to Database Systems – Relational Model – Structure – Relational Algebra – Null Values – SQL – Set Operation – Views – Advanced SQL – Embedded SQL – Recursive Queries – The Tuple Relational Calculus – Domain Relational Calculus.

Unit 2: E-R Model – Constraints – E-R- Diagrams Weak Entity Sets – Reduction to Relational Schemes – Relational Database Design – Features of Relational Design – Automatic Domains and First Normal Form – Decomposition using Functional Dependencies – Multivalued Dependencies – More Normal Forms – Web Interface – Object – Based Databases – Structured Types and inheritance in SQL – Table inheritance – Persistent.

Unit 3: Storage and File Structure – RAID – File Organization – Indexing and Hashing – B Tree – B Tree Index files - Static and Dynamic Hashing – Query Processing – Sorting & Join Operators – Query Optimization – Choice of Evaluation Plans.

Unit 4: Transaction Management – Implementation of Atomicity and Durability – Serializability – Recoverability – Concurrency Control – Dead Lock Handling – Recovery System – Buffer Management.

Unit 5 : Database – System Architecture – Client Server – Architectures – Parallel System – Network Types – Distributed Database – Homogeneous and Hetrogeneous Database – Directory System – Case Study – Oracle – MSSQL Server.

Recommended Text:

1) A. Silberschatz, H.F. Korth and S. Sudharshan, 2006, Database System Concepts, 5th Edition, Tata McGraw Hill, New Delhi.

Reference Books:

1) J. D. Ullman,1988,Principles of Database Systems, Galgotia Publishers, New Delhi
2) C.J. Date, 1985, An Introduction to Database Systems, Third Edition, Narosa, New Delhi.
3) Elmasri and Navathe, 1999, Fundamentals of Database Systems, Third Edition, Pearson Education, Delhi.
4) C. Ritchie, 2004, Relational Database Principals, 2 nd Edition,Thomson, Singapore.

Website and e-Learning Source :

1) http://www.cse.iitb.ac.in/dbms/DataPapers-Local/DBConceptsBook/slide-dir/

Title of the Course/ Paper	**Software Engineering**		
Core Paper-XIX	**II Year & Fourth Semester**	**Credit: 4**	
Objective of the course	This course introduces the concepts of Software Planning, analysis, design and testing.		

Unit 1: Software Engineering - The nature of Software -Software Process Models- Waterfall Model-Incremental process models- Evolutionary process models-– Concurrent models-Specialized process models- Agile process –Agility principles

Unit 2: Requirements Engineering-Establishing the groundwork-Eliciting requirements-Building the Requirements Model-Validating Requirements – Requirements analysis-Modeling Approaches – Data Modeling Concepts- Modeling Strategies – Flow-Oriented Modeling-Behavioral Model.

Unit 3: Design concepts-The Design model-Architectural design-Component level design - User interface design-Software Configuration Management -The SCM Process- Version Control- Change Control- Configuration Audit

Unit 4: The Management spectrum – W5HH principle –Process and Project Metrics – Software Measurement – Software Project Estimation – Decomposition Techniques – Project Scheduling –Risk Management – Identification – Projection –Refinement- RMMM Plan.

Unit 5: Software Review Techniques:-Informal reviews-Formal Technical Reviews - Software Quality Assurance- SQA Tasks, Goals and Metrics- -Software Reliability - A Strategic Approach to Software Testing- Unit Testing- Integration Testing- Validation Testing - System Testing-The Art of Debugging – Software Maintenance

Recommended Texts :

1) Roger. S. Pressman, 2010, Software Engineering A Practitioner's approach, Seventh Edition, Tata McGraw-Hill, New Delhi.

Reference Books:

1) I. Sommerville, 2001, Software Engineering, 6th Edition, Addison Wesley, Boston.
2) Rajib Mal, 2005, -Fundamental of Software engineering , 2 nd Edition , PHI, New Delhi.
3) N. E. Fenton, S. L. Pfleenger, 2004, Software Metrics, Thomson Asia, Singapore.

Title of the Course/ Paper	**Multimedia Systems**		
Core Paper-XX	II Year & Fourth Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of Multimedia Systems.		

Unit 1: Introductory Concepts: Multimedia – Definitions, CD-ROM and the Multimedia Highway, Uses of Multimedia, Introduction to making multimedia – The Stages of project, the requirements to make good multimedia, Multimedia skills and training, Training opportunities in Multimedia. Motivation for multimedia usage, Frequency domain analysis, Application Domain.

Unit 2: Multimedia-Hardware and Software: Multimedia Hardware – Macintosh and Windows production Platforms, Hardware peripherals – Connections, Memory and storage devices, Media software – Basic tools, making instant multimedia, Multimedia software and Authoring tools, Production Standards.

Unit 3: Multimedia – making it work – multimedia building blocks – Text, Sound, Images, Animation and Video, Digitization of Audio and Video objects, Data Compression: Different algorithms concern to text, audio, video and images etc., Working Exposure on Tools like Dream Weaver, Flash, Photoshop Etc.,

Unit 4: Multimedia and the Internet: History, Internet working, Connections, Internet Services, The World Wide Web, Tools for the WWW – Web Servers, Web Browsers, Web page makers and editors, Plug-Ins and Delivery Vehicles, HTML, VRML, Designing for the WWW – Working on the Web, Multimedia Applications – Media Communication, Media Consumption, Media Entertainment, Media games.

Unit 5 : Multimedia-looking towards Future: Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing, Assembling and delivering a project-planning and costing, Designing and Producing, content and talent, Delivering, CD-ROM technology.

Recommended Texts:

1. S. Heath, 1999, Multimedia & Communication Systems, Focal Press, UK.
2. T. Vaughan, 1999, Multimedia: Making it work, 4th Edition, Tata McGraw Hill, New Delhi.
3. K. Andleigh and K. Thakkar, 2000, Multimedia System Design, PHI, New Delhi.

Reference Books

1) Keyes, "Multimedia Handbook", TMH, 2000.
2) R. Steinmetz and K. Naharstedt, 2001, Multimedia: Computing, Communications & Applications, Pearson, Delhi.
3) S. Rimmer, 2000, Advanced Multimedia Programming , PHI, New Delhi..

Website and e-Learning Source :

1) http://www.cikon.de/Text_EN/Multimed.html

Title of the Course/ Paper	Practical – VII: RDBMS Lab		
Core Paper-XXI	II Year & Fourth Semester	Credit: 2	
Objective of the course	This course gives training in design and implementation of data bases for the selected problems.		

1. Library Information Processing.
2. Students Mark sheet processing.
3. Telephone directory maintenance.
4. Gas booking and delivery system.
5. Electricity Bill Processing.
6. Bank Transactions (SB).
7. Pay roll processing.
8. Inventory
9. Question Database and conducting quiz.
10. Purchase order processing.

Title of the Course/ Paper	Practical – VIII: Multimedia Systems Lab		
Core Paper -XXII	II Year & Fourth Semester	Credit: 2	
Objective of the course	This course gives practical training in various multimedia software.		

Flash:

1) To Move an object in the path.
2) Text flip, Text color change,
3) Creating a link using texts and objects, change the color of the object.
4) Shape Tweening and Using shape hints, Motion tweening, hybrid tweening.
5) Character Animation, Object Animation, Drawing Images
6) An application to show the masking effect.
7) Slide show presentation.

Photoshop:

1. To create a greeting card, Create background picture
2. Text effects, photo effects
3. Color , Buttons
4. Editing Images
5. Designing web page

Dream weaver

1. Text Management
2. Tables – Layers
3. Creating menu bar
4. Creating Pages and sites
5. Animation in images

Title of the Course/ Paper	**Information Security**		
Elective – IV	II Year & Fourth Semester	Credit: 3	
Objective of the course	This course introduces basics of Information Security		

Unit 1: Introduction: Security- Attacks- Computer criminals- Method of defense Program Security: Secure programs- Non-malicious program errors- Viruses and other malicious code- Targeted malicious code- Controls against program threats

Unit 2: Operating System Security: Protected objects and methods of protection- Memory address protection- Control of access to general objects- File protection mechanism- Authentication: Authentication basics- Password- Challenge-response- Biometrics.

Unit 3: Database Security: Security requirements- Reliability and integrity- Sensitive data- Interface- Multilevel database- Proposals for multilevel security

Unit 4: Security in Networks: Threats in networks- Network security control- Firewalls- Intrusion detection systems- Secure e-mail- Networks and cryptography- Example protocols: PEM- SSL- Ipsec.

Unit 5: Administrating Security: Security planning- Risk analysis- Organizational security policies- Physical security - Legal- Privacy- and Ethical Issues in Computer Security - **P**rotecting programs and data- Information and law- Rights of employees and employers- Software failures- Computer crime- Privacy- Ethical issues in computer society- Case studies of ethics.

Recommended Text:

1) C. P. Pfleeger, and S. L. Pfleeger, Security in Computing, Pearson Education, 4th Edition, 2003
2) Matt Bishop, Computer Security: Art and Science, Pearson Education, 2003.

Reference Books:

1) Stallings**,** Cryptography & N/w Security: Principles and practice, 4th Edition, 2006
2) Kaufman, Perlman, Speciner, Network Security, Prentice Hall, 2nd Edition, 2003
3) Eric Maiwald, Network Security : A Beginner's Guide, TMH, 1999
4) Macro Pistoia, Java Network Security, Pearson Education, 2nd Edition, 1999
5) Whitman, Mattord, Principles of Information Security, Thomson, 2nd Edition, 2005

Website and e-Learning Source

1) http://www.cs.gsu.edu/~cscyqz/courses/ai/aiLectures.html
2) http://www.eecs.qmul.ac.uk/~mmh/AINotes/

SEMESTER – V

Title of the Course/ Paper	**Object Oriented Analysis and Design**		
Core Paper – XXIII	III Year & Fifth Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of Object Oriented Analysis and Design		

Unit 1: System Development - Object Basics - Development Life Cycle - Methodologies - Patterns - Frameworks - Unified Approach - UML.

Unit-2: Use-Case Models - Object Analysis - Object relations - Attributes - Methods – Class and Object responsibilities - Case Studies.

Unit 3: Design Processes - Design Axioms - Class Design - Object Storage - Object Interoperability - Case Studies.

Unit-4: User Interface Design - View layer Classes - Micro-Level Processes - View Layer Interface - Case Studies.

Unit-5: Quality Assurance Tests - Testing Strategies - Object orientation on testing - Test Cases - test Plans - Continuous testing - Debugging Principles - System Usability - Measuring User Satisfaction - Case Studies.

Recommended Texts :

(i) Ali Bahrami, Reprint 2009, Object Oriented Systems Development, Tata McGraw Hill International Edition.

Reference Books:

(i) G. Booch, 1999, Object Oriented Analysis and design, 2nd Edition, Addison Wesley, Boston

(ii) R. S.Pressman, 2010, Software Engineering A Practitioner's approach, Seventh Edition, Tata McGraw Hill, New Delhi.

(iii) Rumbaugh, Blaha, Premerlani, Eddy, Lorensen, 2003, Object Oriented Modeling And design , Pearson education, Delhi.

Title of the Course/ Paper	**Web Based Application Development**		
Core Paper - XXIV	III Year & Fifth Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of Web Based Application Development .		

Unit 1: Exploring Visual Studio IDE – Toolbox Control, user control creation – menus, Toolbars and Dialog boxes. Programming fundamentals - Variables, formulas and NET Framework- Decision Structures – Loops and Timers.

Unit 2: Debugging Visual Basic programs – Structured Error Handling – Modules and Procedures – Arrays – Collections and System. Collections Namespace. Exploring Text Files and String Processing. Managing windows forms and controls – Inheriting forms and creating base classes.

Unit 3: Database – Introduction to ADO.NET – Bound Controls, SQL Statements, LINQ, Filtering data. Data Representation using the DataGridView control.

Unit 4: Web Application Basics – ASP.NET Application Fundamentals – The Page Rendering Model – Custom Rendering Controls – Composite Controls – Control potpourri – Web Parts – Configuration – Data Binding – Web site navigation – personalization.

Unit 5 : Caching and State management – Session State – Application Data Caching – Caching Output – Diagnostics and Debugging –The HTTP Application class and HTTP Modules – Custom Handlers. ASP.NET Web services- windows communication foundation, Ajax, ASP.NET and WPF Content.

Recommended Text:

1) M. Halvorson, 2009, Microsoft Visual Basic 2008 Step by Step, Prentice Hall of India.
2) G. Shepherd, 2009,Microsoft ASP.NET 3.5 step by step, Prentice Hall of India

Reference Books:

1. B. Evjen, S. Hanselman, D. Rader, 2008, Beginning ASP.NET 3.5 in C# and VB, Wrox Publications.
2. M. MacDonald, 2007, Beginning ASP.NET in VB 2008 from Novice to professional, second edition, Aprèss Publications

Website and e-Learning Source: http://docserve.wordpress.com/2011/04/18/complete-dot-net-notes/

Title of the Course/ Paper	Practical – IX: Web Based Application Development Lab		
Core Paper-XXV	III Year & Fifth Semester	Credit: 2	
Objective of the course	This course gives training in Web technologies.		

(1) Write a VB.NET Desktop application and demonstrate the following (a) Link Label control that opens a web browser in your Visual basic applications (b) Dialog box controls, toolbars and menus.
(2) Write a VB.NET desktop application to demonstrate error handling and debugging options.
(3) Write a VB.NET desktop application to demonstrate .NET framework classes with mathematical methods.
(4) Write a suitable VB.NET Desktop application and demonstrate the following: (a) Input Box (b)List Box(c)Masked Textbox
(5) Write a VB.NET desktop application to demonstrate how to use a Timer control to create a logon program with a password time-out feature
(6) Write a VB.NET desktop application to demonstrate how to create and manipulate large integer arrays. And Demonstrates the Array. sort and Array. Reverse methods and how to use a Progress Bar control to give the user visual feedback during long sorts.
(7) Write a VB.NET desktop application to demonstrate a simple note-taking utility that demonstrate the how to manage Open. Copy, save As, Insert Date, Sort Text, and Exit commands in a program.
(8) Write a VB.NET desktop application to demonstrate how controls are added to a windows form at run time by using program code (not the designer).
(9) Write a VB.NET desktop application to demonstrate the graphics methods in the system. Drawing namespace, including Draw Ecllipse, Fill Rectangle, and Draw Curve.
(10) Write a VB.NET desktop application to demonstrate how to create new classes, properties, and method.
(11) Write a VB.NET desktop application to demonstrate how ADO.NET is used to establish a connection to a MSAccess database and show how the DataGridView control is used to display multiple tables of data on a form. Also demonstrate how navigation bars, datasets, and table adapters are interconnected and bound to objects on a form.
(12) Create a web application and demonstrate rendering control tags and server-side controls and user controls.
(13) Create a web application and demonstrate control validation, the TreeView, and the MultiView/View Controls.
(14) Create a web applications and demonstrate databinding to several different controls, including the GridView. Also illustrate loading and saving data sets as XML and XML schema.
(15) Create a web application and demonstrate session state within a web application.

Title of the Course/ Paper	**Practical – X:Mini Project**		
Core Paper - XXVI	III Year & Fifth Semester	Credit: 2	
Objective of the course	This course is to train the student to create a complete web based application with database connectivity and preparing the report of work done.		

Each student will develop and implement individually application software based on any emerging latest technologies.

Title of the Course/ Paper	**Big Data Analytics**		
Elective – V	III Year & Fifth Semester	Credit: 3	
Objective of the course	This course introduces the basic concepts of Big Data Analytics.		

Unit 1: Basic nomenclature - Analytics process model - Analytics model requirements - Types of data sources – Sampling - types of data elements - Visual Data Exploration and Exploratory Statistical Analysis - Missing Values - Outlier Detection and Treatment - Standardizing Data – Categorization - weights of evidence coding - Variable selection - Segmentation.

Unit 2: Predictive Analytics: Target Definition - Linear Regression - Logistic Regression - Decision Trees - Neural Networks - Support Vector machines - Ensemble Methods - Multiclass Classification Techniques - Evaluating Predictive Models.

Unit 3: Descriptive Analytics: Association Rules - Sequence Rules - Segmentation. Survival Analysis: Survival Analysis Measurements - Parametric Survival Analysis.

Unit 4: Social Network Analytics: Social Network Definitions - Social Network Metrics - Social Network Learning -Relational Neighbor Classifier - Probabilistic Relational Neighbor Classifier -Relational logistic Regression - Collective Inference.

Unit 5: Benchmarking - Data Quality - Software – Privacy - Model Design and Documentation - Corporate Governance. Example applications: Credit Risk Modeling - Fraud Detection - Recommender Systems - Web Analytics.

Recommended Text:

1) Baesens, 2014, Analytics in a Big Data World: The Essential Guide to Data Science and Its applications, Wiley India Private Limited

Reference Books:

1) Michael Minelli, Michele Chambers, 2013, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley CIO
2) Stephan Kudyba, 2014, Big Data, Mining and Analytics: Components of Strategic Decision Making, CRC Press.

3) Frank J. Ohlhorst, 2013, Big data Analytics: Turning Big Data into Big Money, Wiley and SAS Business Series.
4) Foster Provost, Tom Fawcett, 2013, Data Science for Business, SPD.

Title of the Course/ Paper	**Artificial Neural Networks**		
Elective - VI	III Year & Fifth Semester	Credit: 3	
Objective of the course	This course introduces the basic concepts of Artificial Neural Networks.		

Unit 1: Introduction to Neural Networks – Basic Concepts of Neural Networks – Inference and Learning – Classification Models – Association Models – Optimization Models – Self-Organization Models.

Unit 2: Supervised and Unsupervised Learning – Statistical Learning – AI Learning – Neural Network Learning – Rule Based Neural Networks – Network Training – Network Revision-Issues- Theory of Revision- Decision Tree Based NN – Constraint Based NN

Unit 3: Incremental learning – Mathematical Modeling – Application of NNKnowledge based Approaches.

Unit 4: Heuristics- Hierarchical Models – Hybrid Models – Parallel Models – Differentiation Models- Control Networks – Symbolic Methods- NN Methods.

Unit 5: Structures and Sequences – Spatio-temporal NN – Learning Procedures – Knowledge based Approaches.

Recommended Text:

1) L. Fu, 1994, Neural Networks in Computer Intelligence, Tata McGraw Hill, New Delhi.

Reference Books:

1) R. J. Schalkoff, 1997, Artificial Neural Networks, Tata McGraw Hill, New Delhi.
2) Anderson, 2001, An Introduction to Neural Network, PHI, New Delhi.

SEMESTER – VI

Title of the Course/ Paper	**Project & Viva-Voce**		
Core Paper - XXVII	III Year & Sixth Semester	Credit: 16	
Objective of the course	This course is to train the student to execute a real time application of any one of the concern and preparing the report of work done.		

The project work is to be carried out either in a software industry or in an academic institution for the entire semester and the report of work done is to be submitted to the University.