MCA DEGREE

COMPUTER APPLICATIONS

**SYLLABUS
FOR
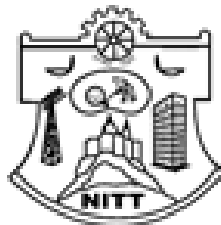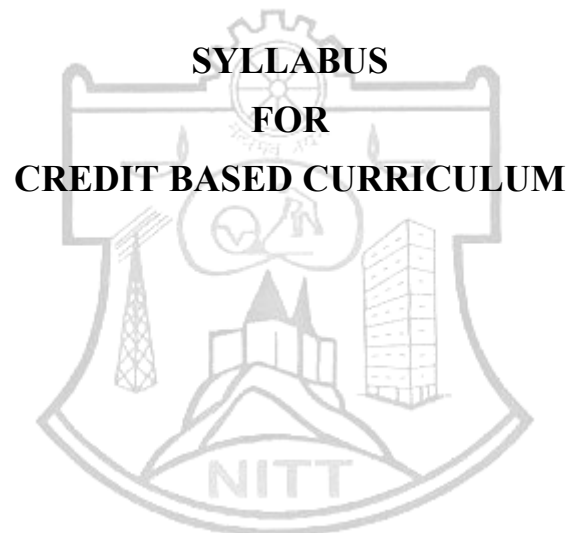CREDIT BASED CURRICULUM**

**DEPARTMENT OF COMPUTER APPLICATIONS
NATIONAL INSTITUTE OF TECHNOLOGY
TIRUCHIRAPPALLI – 620 015, INDIA.**

SEMESTER I

Code	Course of Study	L	T	P	C
CA 711	Programming in C	3	0	0	3
CA 713	Discrete Mathematics	3	0	0	3
CA 715	Computer Oraganization and Architecture	3	0	0	3
CA 717	Accounting and Financial Management	3	0	0	3
MA 621	Numerical and Statistical Methods	3	0	0	3
CA 701	Numerical Computation and C Lab	0	0	4	2
CA 703	Business Communication	0	0	4	2

SEMESTER II

Code	Course of Study	L	T	P	C
CA 710	Data Structures and Algorithms	3	0	0	3
CA 712	Database Management System	3	0	0	3
CA 714	Principles of Programming Languages	3	0	0	3
CA 716	Operating Systems	3	0	0	3
MA 604	Operations Research	3	0	0	3
CA 702	Data Structures Lab	0	0	4	2
CA 704	OS Lab	0	0	4	2

SEMESTER III

Code	Course of Study	L	T	P	C
CA 721	Data Warehousing and Data Mining	3	0	0	3
CA 723	Graphics and Multimedia	3	0	0	3
CA 725	Software Engineering	3	0	0	3
CA 727	Principles of Compiler Design	3	0	0	3
CA 729	Object Oriented Programming Analysis and Design	3	0	0	3
CA 705	DBMS Lab	0	0	4	2
CA 707	Graphics & Multimedia Lab Using C++	0	0	4	2

SEMESTER IV

Code	Course of Study	L	T	P	C
CA 720	Internet and Java Programming	3	0	0	3
CA 722	Computer Networks	3	0	0	3
CA 724	Software Architecture and Software Testing	3	0	0	3
CA 726	Management Information System	3	0	0	3
CA 728	Visual Programming	3	0	0	3
CA 706	Java Programming Lab	0	0	4	2
CA 708	Visual Programming Lab	0	0	4	2

SEMESTER V

Code	Course of Study	L	T	P	C
CA 731	Web Technology	3	0	0	3
CA 733	Client/Server Technology	3	0	0	3
CA ---	Elective I	3	0	0	3
CA ---	Elective II	3	0	0	3
CA ---	Elective III	3	0	0	3
CA 709	Web Technology Lab	0	0	4	1

SEMESTER VI

Code	Course of Study	L	T	P	C
CA 749	Project(Industrial) & Viva- Voce Examination	0	0	0	12

ELECTIVES

Code	Course of Study	L	T	P	C
CA 735	Organizational Behavior	3	0	0	3
CA 736	High Performance Computing	3	0	0	3
CA 737	Neural Networks	3	0	0	3
CA 738	Modelling and Computer Simulation	3	0	0	3
CA 739	Systems Programming	3	0	0	3
CA 740	Image Processing	3	0	0	3
CA 741	Cryptography	3	0	0	3
CA 742	Software Agents	3	0	0	3
CA 743	AI and Expert Systems	3	0	0	3
CA 744	Marketing Management	3	0	0	3
CA 745	Microprocessors and Interfacing Techniques	3	0	0	3

SEMESTER I

CA711 PROGRAMMING IN C

Introduction to Computers-Classification and Applications, H/W and S/W components,Programming paradigm, Program Development Cycle, Generation of Programming languages.

C Programming Language Fundamentals : Character set – Syntax – Input and output – Program writing , Control Structures – Iterative structures.

Arrays - Functions – Storage Classes – Pointers.

Structures and Unions – Dynamic Memory Allocation

File Allocation - Command Line Arguments Preprocessor Directives.

Reference Books
1. Darnell & Margolis " ANSI C –A Systematic programming Approach" , 1991, Narosa
2. B.W. Kerninghan, D.M.Ritchie," The C Programming Language", 2nd Edition, 1995, PHI.

CA713 DISCRETE MATHEMATICS

Sets - Relations – Posets - Functions - Math Inductions (Simple and strong) – Combinatorics.

Graphs - Basic concepts - Connectedness - Isomorphism – complements - Matrix representation of graphs - Adjacency and Incidence Matrices.

Trees, Spanning trees, Minimal Spanning tree Algorithms - Euler graphs - Hamiltonian directed graphs - Strongly connectedness.

Mathematical Logic – Predicate Calculus – Scope – Binding – Resolution – Regular Grammars.

Finite Automata – Context-Free Grammars – Chomsky's Normal form -Griebach Normal Form - Push-down Automata - Equivalence of CFL's and PDA's - Non- context free languages.

Reference Books
1. Arthur Gill, "Applied Algebra for Computer Science", 1976, PHI
2. Narsingh Deo, "Graph theory and application to Engineering and computer Science", 1986, PHI

CA715 COMPUTER ORGANIZATION AND ARCHITECTURE

Objective: To introduce the nature and characteristics of modern day computers.

Pre–requisites: Knowledge of fundamentals of Digital Computers.

Number Systems, Binary Arithmetic, Boolean Algebra, Map Simplifications, Gates - Combinational Circuits - Sequential Circuits.

Memory, Internal Memory, External Memory, Memory Organization, Associative Memory, Virtual Memory, Cache Memory.

CPU, Arithmetic and Logic Unit, Instruction Sets, Instruction cycle, Addressing Modes and formats, Instruction Pipeline, Processor organization, Register organization, Control Unit Operation.

External Devices, I/O modules, Programmed I/O, Interrupt Driven I/O, Direct Memory Access, I/O Channels and processors, Asynchronous Data Transfer.

Reduced Instruction Set Computers, Complex Instruction Set Computers, Super Scalars, Vector, Parallel Cluster, Distributed, Embedded and MultiCore Processors.

Reference Books
1. William Stallings, "Computer Organization and Architecture", 7th Edn. 2006, PHI.
2. M. Moris Mano and Michael D. Ciletti, Digital Design, 4th Edn, 2007, Pearson.
3. Hayes, J.P. "Computer Architecture and Organisation", 3rd Edn., 1998, McGraw Hill.

CA717 ACCOUNTING AND FINANCIAL MANAGEMENT

Assets – Liabilities – Their various types - Trading account – Accounting records and Systems – Limitations - Income statement – Preparation and Interpretation.

Depreciation – Methods - Inventory methods, Sources of working capital, Fund flows, Cash flows – Financial Statement analysis.

Ratio analysis - Use of ratios in interpreting Trading Accounts and Financial Statements, Limitations – Management Accounting.

Variable costs – Fixed costs – Cost Volume Profit Analysis – Break even marginal and full costing contribution, Standard costing - Analysis of variance computer accounting and algorithms.

Characteristics of Budgets - Forecasting – Long term, Short term – Methods of capital investment decision making, Sensitivity Analysis, Cost of capital.

Reference Books
1. Maheswari S.N. and Maheswari S.K., "An Introduction to Accountancy", 5th edition, Vikas Publishing, New Delhi.
2. Manmohan and Goyal, "Principles of Management and Accounting", 5th Edn. Sahitya Bhawan, Agra.

MA621 NUMERICAL AND STATISTICAL METHODS

Sources and various types of errors – Chopping and Rounding in different number systems – stability of numerical algorithms – transcendental and polynomial equation - Iterative method

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- Regula-Falsi method – Newton-Raphson method - Roots of polynomials – Graeffe's and Bairstow methods.

Solution of system of linear algebraic equations - Gauss elimination - Gauss-Jordan method - Jacobi and Gauss-Seidel methods - Interpolation – Polynomial interpolation - Lagrange and Newton interpolation - Data fitting- Method of least squares.

Euler's method and its modified form – Runge-Kutta method of fourth order – Predictor-Corrector methods - Milne's method - Adams' method.

Binomial, Poisson and Normal Distributions – Fitting of probability distributions – Correlation and regression - Linear regression - Correlation coefficient - Multiple linear regression.

Tests of Hypothesis – Testing for Attributes – Mean of Normal Population – One-tailed and Two-tailed tests – Student t-test, F-test and Chi-Square test – ANOVA – One way and Two way Classifications.

Reference Books
1. Bowker and Liberman, "Engineering Statistics", Prentice-Hall.
2. Gerald, C.F., and Wheatley, P.O., "Applied Numerical Analysis", Addison Wesley.

CA701 NUMERICAL COMPUTATION AND C LAB

Exercises for learning basic features of C and exercises to solve various numerical methods

CA703 BUSINESS COMMUNICATION

Communication: concepts and Goals – Theories of communication – Organizational and personal goals.

Psychology of communication – Channels and Networks – Barriers to and cost of communication – Message Planning – Purposive Listening – types – Familiarity to different accents and tones.

Oral Communication – Persuasive speech practice – Presentation skills – Group Dynamics – Interview skills – Telephone strategies.

Business Correspondence – Different kinds of written communication in business organizations.

Marketing Language – Creativity and Appeal – Report writing practice.

Reference Books
1. Simon Sweeney, "English for Communication", CUP.
2. Leo Jones and Richard Alexander, "New International Business English", CUP.

SEMESTER II

CA710 DATA STRUCTURES AND ALGORITHMS

Pre–requisites : Introduction to theory of functions and knowledge on primitive data types

Stacks, Queues, and Linked Lists with Applications - Representing Rooted Trees - Direct Address Tables, Hash Tables, Hash Functions, Open Addressing – Binary Search Trees - Red-Black Trees, B-Trees.

Graphs - Representations, BFS and DFS - Disjoint Sets - Representation and operations.

Algorithms - Complexity, Recurrences and Solutions - Design Strategies - Recursion, Divide-and-Conquer, Greedy and Dynamic Programming - Analysis of Sorting Algorithms - Linear and Binary Search - Selection in Linear Time – Elements of Greedy strategy, Huffman Codes.

MST - Kruskal's and Prim's - Shortest Paths – Single-Source and All-Pairs, Topological Sort, Probabilistic Methods for Selection, Sorting and Searching.

Basic Concepts of NP-Hard and NP-Complete Problems – Cook's Theorem (Without Proof) – Reduction – Clique Decision Problem.

Reference Books
1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Second Edition, 2001, PHI.
2. Ellis Horowitz, Sartaj Shani, and S.Rajasekaran, "Fundamentals of Computer Algorithms", 2000, Galgotia.

CA712 DATABASE MANAGEMENT SYSTEMS

Pre–requisites : Programming Languages – File Concepts

File System Versus DBMS, Advantages - ER-Model: Entities, Relationships, Additional Features of ER Model, Conceptual Design with ER Model.

Relational Model – Constraints – Querying – Views - Relational Algebra and Relational Calculus - SQL & QBE.

Organization and Indexes - B+ Trees – Query Optimization.

Database Design - Functional Dependencies, Normalization – I to V Normal Forms.

DB Tuning – Security – Transaction Management – Concurrency Control – Crash Recovery.

Reference Books
1. Raghu Ramakrishnan & Johannes Gehrke, "Data Base Management Systems, 3rd Edition, McGraw-Hill International Editions, 2000.
2. 2. Silberschatz, Korth & Sudarshan, "Data Base System Concepts", Tata Mc-Graw Hill, 2002.

CA714 PRINCIPLES OF PROGRAMMING LANGUAGES

Pre–requisites : Computer Programming hands-on with any one language

Programming Domains - Language Evaluation Criteria - Influences on Language Design - Language Categories - Language Design Trade-Offs - Implementation Methods - Programming Environments.

Data Types - Primitive and Non-primitive Data Types - Type Checking, Scopes, Life- time and Statements - Modular and Object-oriented Programming - Subprograms - Parameter-Passing Methods, Overloaded Subprograms. Abstract Data Types – Encapsulation - Data Abstraction - Design Issues - Parameterized Abstract Data Types - Design Issues for Object-Oriented Languages.

Functional Programming - Mathematical Functions Fundamentals – LISP, Scheme and Haskell - Applications of Functional Languages.

Logic Programming and Concurrency -Logic Programming Languages - Predicate Calculus, Predicate Calculus and Proving Theorems – Prolog – Applications. Concurrency - Subprogram-Level Concurrency, Semaphores, Monitors, Message Passing, Java Threads, Statement-Level Concurrency.

Reference Books
1. Sebesta R.W., "Concepts of Programming Languages", Seventh Edition, 2006, Addison-Wesley.
2. Sethi R.D, "Programming Languages: Concepts and Constructs", Second Edition, 2003, Addison-Wesley.

CA716 OPERATING SYSTEMS

PRE - REQUISITES: Computer Organization and Architecture and Data Structures

Operating System Concepts — Processes, Files, System Calls. Shell, OS structure — Interprocess Communication — Classical IPC problems — Process Scheduling – Resources Management issues – Types - Integrated Scheduling- Protection of resources.

Storage Management - Virtual Memory — Page replacement algorithms - Design issues - Files and Directories Files System implementation — Deadlocks.

I/O systems - Device drivers - - Disk scheduling algorithms- Modeling - Disk Caching - Design issue protocols.

Client — Server model remote Procedure call — Group Communication - Synchronization on distributed system — Clock synchronization — mutual deadlocks in distributed systems.

Parallel Hardware - OS for two Processor system - Atomic action - Multiprocessor OS - Threads — system model — processor allocation — distribution file system design — implementation and trends on distributed file systems.

Reference Books
1. Andrew S. Tenenbaum, "Modern Operating Systems" 2002, Prentice- Hall of India
2. William Stallings, "Operating Systems", 2003, Pearson education

MA604 OPERATIONS RESEARCH

One dimensional unconstrained optimization – Fibonacci method – Golden section method – Quadratic approximation method – constrained optimization with Lagrangian multipliers – simple problems.

Formulation of linear programming problems – Simplex method – Big M method – Two Phase method – Dual Simplex method – Primal Dual problems - Transportation problem – Assignment problem.

Dynamic Programming - Formulation – Investment problem – General allocation problem – Stage coach problem – Production scheduling – Reliability problem.

Functions of inventories – Economic lot size quantity with or without shortage cost – Multiiterm deterministic inventory problem – Inventory problem with price breaks – probabilistic models with uniform demand (discrete and continuous cases).

Queuing theory - notation and assumptions – characteristics of queue – Poisson input process – exponential service times – Queuing models – M/M/1 – M/M/C – M/M/1/N – M/M/C/N – Simple problems.

Reference Books
1. Billy.E.Gillet, "Introduction to Operations Research – A Computer Oriented Algorithmic Approach", 1976, McGraw Hill.
2. Taha .H.A, " Operations Research an Introduction", 3rd Edition, 1982, Macmillan

CA702 DATA STRUCTURES LAB

Pre-requisites: CA 710
Outline: Exercises to implement various data structures and algorithms using C and C ++

CA704 OPERATING SYSTEMS LAB

Pre-requisites: CA 716
Outline: Exercises to learn various commands in prevailing OSs and implement scheduling and the like algorithms.

SEMESTER III

CA721 DATA WAREHOUSING AND DATA MINING

Pre – requisites: CA 710, CA 712

Introduction - motivation, importance, Functionalities, Basic DM Vs KDD, DM Metrics, DM Applications.

Data Warehousing: Difference between Operational Database and Data warehouse - Multidimensional Data Model -DW Architecture Efficient Processing of OLAP queries, Metadata repository.

Data Preprocessing: Data cleaning, Data Integration and Transformation, Data Reduction, Discretization and concept Hierarchy Generation.

Data Mining Query Language- Association Rule Mining - Classification and Prediction - Cluster Analysis - Outlier Analysis.

Web content Mining, Web Structure Mining, Web usage Mining. Spatial Mining - Temporal Mining.

Reference Books
1. Jiawei Han and Micheline Kamber, "Data Mining : Concepts and Techniques", Harcourt India Private Limited, First Indian Reprint,2001
2. Margaret H. Dunham, "Data Mining : Introductory and Advanced Topics", Pearson Education, First Indian Reprint,2003

CA723 GRAPHICS AND MULTIMEDIA

Prerequisites: Matrix Theory, Analytical Geometry, Trigonometry

Graphics: Display Devices – Interactive Input devices – Graphics – Bresenham's Line Drawing Algorithm – DDA Algorithm – Comparison of Line Drawing Algorithms – Circle Drawing Algorithm.

Two-dimensional Transformations – Scan Conversion Algorithms – Windowing – Clipping – Segmenting – Viewport Transformations.

Three-dimensional Transformations – Hidden Surface Elimination Algorithms.

Multimedia: Multimedia Architecture – Multimedia File formats – Compression – Image Compression – Video Compression – Audio Compression.

DVI Technology – Video & Audio Codecs – Virtual Reality – GUI Design - Playback – Hypermedia Linking and Embedding.

Reference Books
1. Donald Hearn, M. Pauline Baker, "Computer Graphics", 1992, PHI.
2. Fred T. Hofstterm, "Multimedia Literacy", 1995, McGraw Hill.

CA725 SOFTWARE ENGINEERING

Introductory concepts – The evolving role of software – Its characteristics, components and applications- A layered technology – the software process – Software process models - Software process and project metrics – Measures, Metrics and Indicators.

Software Project Planning – Project planning objectives – Project estimation – Decomposition techniques – Empirical estimation models - System Engineering.

Analysis and Design – Concepts, Principles, Methods for traditional, Real time of object oriented systems – Comparisons – Metrics.

Testing fundamentals – Test case design – White box testing – Basis path testing – Control structure testing – Black box testing – Strategies: Unit testing integration testing – Validation Testing – System testing – Art of debugging – Metrics, Testing Tools - Formal Methods.

Clean-room Software Engineering – Software reuse – Reengineering – Reverse Engineering.

Reference Books
1. Roger S. Pressman, "Software Engineering-A practitioner's approach", Fourth Edition, 1997, McGraw Hill.
2. Fairley .R.E, "Software Engineering", 1985,McGraw Hill

CA727 PRINCIPLES OF COMPILER DESIGN

Pre – requisites: CA 713, CA 714

Lexical Analysis, Regular Expression, Nondeterministic Automata, Deterministic Automata equivalent to NFA's - Minimizing the states of DFA, Implementation of Lexical Analyzer.

Syntax Analysis – Top-down Parsing Concepts – Bottom-up Parsing , LR Parsers , Parser Generators.

Syntax directed Definitions, Construction of Syntax trees – Top down Translation, Bottom up Evaluation of Inherited Attributes, Recursive Evaluators, Assigning Space at Compiler Construction time.

Type checking – Overloading of functions and operators, polymorphic function - Intermediate Languages - Representation of Declarations, Assignment statement , Boolean Expression, Back Patching, Procedure calls.

Design of the code generators - DAG representation of Basic blocks, Peephole optimization, Code optimization – Global data flow Analysis, Loop optimizations.

Reference Books
1. Alfred Aho, Ravi Sethi, Jeffy D Ullman, "Compilers – Principles, Techniques and Tools"' 1986, Addison Wesley
2. Dhamdhere D.M, "Compiler Construction Principles and Practice ", 1981, Macmillan

CA729 OBJECT ORIENTED PROGRAMMING ANALYSIS AND DESIGN

Pre – requisites: C or Any Procedure Oriented Programming Language

Concepts- Classes and Objects- Overloading Features-Friends – Arrays, Pointers – Inheritance – Types – Polymorphism – Virtual Functions – File Handling – Streams - Generic Programming - STL – Exception Handling.

Object Model – Evolution, Elements – Nature of Classes and Objects – Relationships among classes.

Classification – Identification of classes and objects – Key abstractions and mechanisms – Basic and Advanced Modeling techniques.

Notation elements — Class, State Transition object, Interaction, module and process diagrams.

UML — OMT analysis (James & Rumbaugh) - Comparison of various OO Analysis of Design Methodologies — Case Studies.

Reference Books
1. Bjarne Stroustrup, "The C++ Programming Language", 3rd Edition, Addison-Wesley, 1997.
2. Grady Booch, Ivar Jacobson, and James Rumbaugh, "UML user guide", Addison Wesley Professional, 2005.

CA705 DBMS LAB

Pre – requisites: CA 712
Outline: Exercises / case studies that require table design, normalization and query building.

CA707 GRAPHICS AND MULTIMEDIA LAB (using C++)

Pre – requisites: CA 723
Outline: Exercises to learn implementing various graphics algorithms using C++ and Exercises to learn multimedia concepts.

SEMESTER IV

CA720 INTERNET AND JAVA PROGRAMMING

Prerequisites: Object Oriented Analysis and Design, C++

Introduction— History of Internet and Evolution (LAN, WAN, etc.) — Basics of Communications-Accessing the Internet— Connection Services— Internet Resources— Internet Addressing — Elements associated with internet - hardware, media, etc.

Internet Protocols — ICMP, IGMP, UDP, TCP/IP, HTTP — Other Protocols — Telnet, Gopher, WAIS Applications — Mail and its Types — MIME - FTP— Remote access and Transactions.

Services, Searchers, Browsers: Directory Services, Finger, WAIS, Whois, DNS, Net Find, X 500 — Mosaic. Image, Binary Files via Newsgroups, Browsing and Searching — Web indexes — Search Engines and their types with design (e.g. Google, Yahoo, etc.).

Java - Features — Structure — Elements of Java — Array, String, String Buffer, Vectors — Methods — Object Oriented Features- Classes, Objects — Constructors – Package – Inheritance – Interface – Abstract Class - Special types of classes.

Applet Programming – AWT – Graphics - Event Handling – Exception Handling — Utilities and Collections — I/O Streams - Multithreaded Programming - Swings - Networking - Examples in Servlets and RMI - Database Handling – Mobile and Wireless Applications.

Reference Books
1. Deitel & Deitel, "Internet and WWW — How to Program?"- Prentice Hall, 2000.
2. Patric Naughton and Herbert Schildt, "Java2 Complete Reference", Tata McGraw Hill, 1999.

CA722 COMPUTER NETWORKS

Pre-requisites: Computer Organization and Architecture, Operating Systems

The Network Edge - The Network Core - Network Access and Physical Media – Internet - ISPs and Internet Backbones - Delay and Loss – Top-Down Approach - Protocol Layers and their service models.

Principles of Application Layer Protocols - The Web and HTTP - FTP - Electronic Mail in the Internet – DNS: The Internet's Directory Service.

Transport-Layer Services - Multiplexing and Demultiplexing - - Principles of Reliable Data Transfer - Congestion Control – TCP's Congestion Control.

Network Service Model - Routing Principles - Hierarchical Routing - The Internet Protocol - Router's internal features – Routing Algorithms.

Data Link Layer - Error Detection and Correction Techniques - Multiple Access Protocols - LAN Addresses and ARP - PPP: The Point-to-Point Protocol.

Reference Books

1. Kurose, J.F. and Ross K.W., "Computer Networking: A Top-Down Approach Featuring the Internet", Third Edition, 2005, Addison-Wesley.
2. Forouzan B A., "Data Communication and Networking", Third Edition, 2004, McGraw Hill.

CA724 SOFTWARE ARCHITECTURE AND SOFTWARE TESTING

Prerequisites: CA 725

Software components - COTS and infrastructure - Software variability management.

Software architecture design methods - Architecture evaluation and assessment methods - architectural styles.

Design Patterns - Evolution patterns - Software artifact evolution processes - Case studies - Java Beans.

Software Testing - Verification and Validation with the Software Life-Cycle- Formal Methods - Systematic Methods - Program Analysis Test Data Generation- Software Quality Assurance- Software Metrics- Comparison.

Software Reliability - Comparison of Software and Hardware Reliability- Development of Software Reliability Models- Parameter Estimation of Models and Prediction of Reliability Levels- Comparison of Models- Software Reliability and Software Testing Techniques-Application to Safety Critical Systems.

Reference Books

1. Len Bass, Paul Clements, and Rick Kazman, "Software Architecture in Practice*", 2nd Ed. Addison-Wesley Longman, Inc., Reading, MA, 2003.
2. Jacobson, Ivar, Griss, Martin, Jonsson, and Patrik, "Software Reuse, Architecture, Process and Organization for Business Success", Addison-Wesley Longman, Inc., Harlow, UK, 1997.

CA726 MANAGEMENT INFORMATION SYSTEM

Foundations of information systems :- Decision Making Process – Simon's Model – Global Business Environment and organizations – Introduction to IS in business – Solving problems with IS.

Introduction to MIS - Information Technology : A Managerial overview – Computer Software – hardware – Database Management – Normalization Process – Type of Data Model.

Business Applications of Information Technology : Internet – Intranet and Extranets – Decision Support System – Transaction Processing System.

EIS – Enterprise wide Information Systems - Building Information Systems and Implementation – Tools and Techniques for Building – System Analysis and Design – Methodologies.

Implementation Techniques - Management of Information System: Functional Subsystems of MIS – marketing, finance, HRD, Manufacturing – Strategic Information Systems.

Reference Books
1. Obrien, J.A, "Management Information Systems", 4th Edition, TMH, 1999.
2. Landon K.C. & Landon J.P., MIS – Macmillan – New York, 1988.

CA728 VISUAL PROGRAMMING

GUI concept – Data types – GUI Architecture – Message Processing – Keyboard and Mouse Handling Displaying Text and Graphics – File and Printer Handling – DDE – DDL – ODBC – COM/DCOM / CORBA - .NET Namespaces, Assemblies, .NET Memory Management, Process Management, Interoperation with COM.

Transactions in .NET, Structures Exception Handling, Code Access Security, Web Controls using the .NET framework, The .NET Framework Class Library.

VB.NET – basic features - Inheritance, Value Types, Operator Overloading, Exception Handling, Arrays and Collections, Properties, Delegates and Events, Windows Forms, Dialog Boxes and Controls, Graphical Output, Files, Data access.

C#.NET – basic features, Arrays and Collections, parameter arrays, Inheritance, Garbage collection and Resource management.

ASP.NET – Validation controls – Accessing Data with web forms – Building ASP.NET applications – Building and XML web service handling XML.

Reference Books
1. Jeff Prosise, Programming Microsoft .NET, Microsoft Press
2. David S Plat, Introducing Microsoft .NET, 3rd Edition, Microsoft Press

CA706 JAVA PROGRAMMING LAB

Pre-requisites: CA 720
Outline: Exercises / case studies that require object-oriented programming in JAVA

CA708 VISUAL PROGRAMMING LAB

Pre-requisites: CA 728
Outline: Exercises to learn programming in C#, ASP, VB - .NET languages (etc.)

SEMESTER V

CA731 WEB TECHNOLOGY

Prerequisites: CA 729, CA 720

Introduction to Client Server Architecture/Computing — Various Components of Internet and Web — Web Related Protocols — HTML — List, Table, Frame, Form Tags with their usage — Creation and Design of Static and Dynamic Web Pages — Web Design characteristics.

CGI: Background — Working Features — Simple Applications — JavaScript: Basics, Statements, Objects, Methods, Properties — Event Handling — Integrating JavaScript with various elements of HTML — Cookies – JARS – Applications – Overview of Perl.

XML: Comparison with HTML — DTD — XML Elements — Content Creation — Attributes — Entities — XSL — XLINK — XPATH — XPOINTER — Namespaces — Applications — integrating XML with other applications.

Introduction to ASP: Objects — Components; JSP : Objects — Components; PHP - Database Management — Java Beans as Components - Applications.

Middleware Technologies: CORBA, COM, DCOM — Ecommerce: Introduction, Types — Architectures — Applications — Security.

Reference Books
1. SheIly Powers et al. "Dynamic Web Publishing", Techmedia, 1998.
2. Chris Bates, "Web Programming – Building Internet Application", 2nd Edition, Wiley-Dreamtech India Pvt. Ltd.,2002.

CA733 CLIENT/SERVER TECHNOLOGY

Definition - Application Tasks: Rightsizing, Benefits of Client/Server Computing, Evolution of Client Server Computing- Hardware and Software Trends- Evolution of operating systems-Networking Trends- Business Considerations.

Client/Server Applications: Components, Classes, Categories. Obstacles, Open Systems and Standards, Standards setting organizations. Factors for success, RPC messaging – Peer to Peer - Client Components, Client Operating Systems, GUI, Database Access, Application Logic.

Server Hardware and Environment, Categories of Servers, SQL DB Servers, Network management and Network Computing Environment, Network operating systems, Loadable Module, Middleware, Data warehousing.

GUI Design standards, Interface Independence, Platform Independence, Transaction Processing, Connectivity, Reliability, Back up and Recovery mechanisms, TP Monitors, Groupware, Distributed Object Components.

Future Trends – CORBA, COM, OLE,WEB Server, Mobile Computing, Network Management Standard, Intelligent Wiring Hubs, Wireless LANS, ATM Switching, Object Technology, CASE Tools, Repositories, Multimedia, Workgroup Computing.

Reference Books
1. Dawna Travis Dewire, "Client/Server Computing", 1993, McGraw Hill
2. Bruce Elbert & Bobby Martyna, "Client/Server Computing: Architecture, Applications and Distributed Systems Management", 1994, Artech House.

CA709 WEB TECHNOLOGY LAB

Pre-requisites: CA 731
Outline: Exercises / case studies on HTML, XML, PHP, JSP etc.

ELECTIVES

CA735 ORGANIZATIONAL BEHAVIOR

Organizational Behavior – The human relations movement, The Hawthorne studies, Models for organizational behavior. Background of the Behavioral Science –- Management concepts-Design used to answer question and Test theories, Reliability and Validity of measures - Managerial Perspective.

Individual behavior - Personality – Meaning and development, Major determinants of Personality theories of Personality, Stress – causes and effect of job stress, coping strategies for stress Perception – sensation versus perception.

Motivation – Primary motives, General motives, secondary motives, and Work motivation approaches – Job design, Performance appraisal, Goal setting.

Interpersonal and group behavior - The nature of Groups – Dynamic of informal groups Individual conflict, Interpersonal conflict, Inter-group behavior and conflict - Leadership – Theories of leadership, leadership style.

Organization Development - Morale, characteristics of O.D., Traditional approaches to O.D. Other Modern Techniques – New O.D. techniques for the future.

Reference Books
1. Fred Luthans, "Organizational behavior", 1977, McGraw Hill.
2. Keith Davis, "Human behavior at work Human relations and Organizational Behavior", 1982, Tata McGraw Hill, New Delhi.

CA736 HIGH PERFORMANCE COMPUTING

Prerequisites: CA 710, CA 715

Introduction – Computational Demands – Parallel Processing Terminology – Types– Flynn's Taxonomy – Processor arrays, Multiprocessors, Multi computers- Fundamental Algorithms – Criteria for Complexity Analyses.

Parallel algorithms on various models with complexity analyses for selection, merging sorting and searching problems - Parallel Programming Languages – C* and Sequent C - Comparison of Parallel Computing with Supercomputing and Distributed Computing.

Distributed Computing: Message Passing Model – PVM – Remote Procedure Call.

Capabilities of Grid Computing – Grid concepts and components- Grid Construction – Business Perspective - Early Grid Activities – Current Grid Activities – An Overview of Grid Business Areas – Grid Applications - Grid Computing Infrastructure and limitations.

Low Cost Parallel Computing – Cluster Computer and its Architecture – Classifications – Commodity Components - Network Services / Communication SW – Resource Management and Scheduling – Programming Environments and Tools – Cluster Applications - Case studies.

Reference Books
1. A.Y.Zomaya, "Parallel and Distributed Computing Handbook", 1995, McGrawHill Professional.
2. Michael J.Quinn, "Parallel Computing: Theory and Practice", Second Edition, 1994, Tata McGrawHill, Inc.

CA737 NEURAL NETWORKS
Prerequisites: CA 722

Introduction - Artificial Neural Network – Principles and promises – Pattern and Pattern Recognition tasks – Conventional methods – Promises of neural networks – Scope - Characteristics, Neuron models.

Basics of ANNs - Characteristics of biological neural networks – Artificial neural networks – Terminology – Models of neuron – Topology – Activation and Syntactic Dynamics.

Pattern Recognition Methods And Concepts In ANN - Functional units of ANN for pattern recognition tasks – Pattern recognition by feed forward and feed back ANNs – Pattern Association – Pattern classifier – Perception – Pattern Mapping – Back propagation learning algorithm.

Storage, Clustering and mapping - Pattern storage(STM) – Pattern Clustering – Competitive Learning – feature mapping – Kohonen's Self organising networks - Architecture, memory and applications - Neural Architecture for complex pattern recognition task – Associative memory.

Data and Image compression – Pattern Classification – Spatio temporal patterns(Avalanche) – Pattern variability(Neocognitron) – Other Applications.

Reference Books
1. J.Hertz, A.Korth and R.G.Palmer, "An Introduction to the Theory of Neural Computation", Addison Wesley, 1991.
2. James A.Freeman and David M.Skapura, "Neural Networks: Algorithms and Applications", Addison Wesley, 1991.

CA738 MODELING AND COMPUTER SIMULATION

Prerequisites: Probability Distributions, Any Programming Language.

Simulation and Simulation Software - Systems – Models – Types, Components, Steps in Modeling –Simulation of statistical queuing, manufacturing and material handling.

Useful Statistical Models – Discrete Distribution – Continuous Distributions – Poisson – Empirical Distribution – Manufacturing and Material Handling System – Models – Goals and Performances Measure – Issues – Queuing System – Characteristics – Transient and Steady-State Behaviour of Queues – Long-Run Measures – Infinite – Population Markovian Models.

Random Numbers - Generation of Pseudo Random Numbers – Mid-Square Method – Linear Congruential Generators – Generating Random Variates from Continuous and Discrete Probability Distributions. System dynamics and object oriented approach in simulation.

Generalization of Growth Models – System Dynamics Diagram – Decision Function – Multi Segment Model – Representation of Time Delays – Inventory and Flow Distribution Systems – World Model – Object Oriented Approach – Rule Based Approaches– Casual Loops – Flow Diagrams – Levels and Rates – Simple examples of Animation.

Analysis – Input – Output – Verification and Validation of Simulation Models – Comparison and Evaluation of Alternative System Design.

Reference Books
1. J.Banks, John.S.Carson and B.L.Nelson, "Discrete Event System Simulation", 1996, PHI
2. Geoffrey Gordon, "System Simulation", 2nd Edn. 1989, PHI

CA739 SYSTEMS PROGRAMMING

Prerequisites: CA 715, CA 716

Language Processing – Its activities, Fundamentals of Language Processing Development Tools – System Software and Machine Architecture – Hypothetical Computer – CISC and RISC Machines.

Basic Assembler functions – Machine-dependent and Machine-independent Assembler features – Assembler Design options – Implementation Examples.

Basic Macro Processor functions – Machine-independent Macro Processor features – Design options and Examples.

Basic Loader Functions – Machine-dependent and Machine-independent Loader features – Design options – Linkage Editors, Dynamic Linking and Bootstrap Loaders. Implementation Examples.

MS-DOS linker, SUN-OS linkers and Cray MPP linker - Comparison of Compilers and Interpreters – Software Tools – Tools for Programming Development – Editors – Debug monitors – Programming Environments – User Interfaces - Device Drivers – Windows NT internals – UNIX Shell Programming and Batch Processing in MS-DOS

Reference Books
1. Leland L. Beck, "System Software – An Introduction to Systems Programming", 3rd Edition, 1999, Addison Wesley.
2. D.M.Dhamdhore, "Systems Programming and Operating Systems", 2nd Edition, 1997, TMH.

CA740 IMAGE PROCESSING

Prerequisites: CA 710, CA 707

Digital image fundamentals - Introduction – Image Representation – Steps in Image Processing – Elements of Image Processing – Sampling and Quantization – Relationships between pixels – Imaging Geometry.

Image transforms - Fourier, Discrete Fourier, Fast Fourier, Walsh, Hadamard, Discrete Cosine and Haar Transforms - Image enhancement and restoration.

Domain methods – Point processing – Filtering – Color Image Processing – Degradation Model – Circulant and Block Circulant matrices – Restoration – Inverse Filtering- Image compression and coding.

Redundancy – Compression models – Coding Theorems – Different types of Coding – Lossy and Lossless compression - Compression Standards - Image segmentation.

Detection of Discontinuities – Boundary Detection – Edge linking – Thresholding – Segmentation – Image representation – Morphology – Interpretation.

Reference Books
1. R. Gonzalez and R. E. Wood, Digital Image Processing, Prentice Hall of India, 1992.
2. K.Pratt, Digital Image Processing, McGraw Hill, 1981.

CA741 CRYPTOGRAPHY

Origins of Cryptography – Issues – Codes and Ciphers – review of complexity results – Factoring and primality testing – GCD and its complexity – review of finite fields and cyclic groups.

Block Ciphers: Affine Ciphers, Substitution Ciphers, Vigenere, Hill Cipher – DES, Feistel Ciphers and the problem of breaking them, Congruences, Complete Residue Systems – Modular Arithmetic – The field Z/pZ – Euler's Theorem and Fermat's Little Theorem – Euler's Φ function – Chinese Remainder Theorem.

Stream Ciphers : Information Theoretic considerations – Linear Feed back Shift Registers and associated results – Geffe generator – One way functions and trapdoor – Diffe-Hellman Key exchange – Bit commitment using symmetric key.

Discrete Logarithm, hash functions, RSA and its correctness – Modular Exponentiation – Miller-Rabin-Selfridge Primality Testing – EI Gamal Crypto System – Authentication – Digital Signatures – Merkle-Hellman Knapsack Public Key Cipher.

Pollard p-heuristic – Pollard p – I Algorithm, Continued Fraction Factoring Algorithm, Quadratic Sieve Algorithm, Number Field Sieve, Zero – Knowledge Proof Idea – Recent Developments

Reference Books

1. A.J. Menezes .P. Van Oorschot and S. Vanstone, "Handbook of Applied Cryptography", CRC Press
2. H.Mel and D.Baker, "Cryptography Decrypted", 2001, Addison Wesley

CA742 SOFTWARE AGENTS

Prerequisites: CA 710

Definitions – History – Intelligent Agents – Structure – Environment – Basic Agents - Formulating – Search Strategies – Intelligent search – Game playing as search. Knowledge Based Agents.

Representation – Logic – First order logic – Reflex Agent – Building a knowledge base – General Ontology – Inference – Logical Recovery - Planning Agents.

Situational Calculus – Representation of Planning – Partial order Planning – Practical planners – Conditional Planning – Replanning Agents - Agents and uncertainty.

Acting under uncertainty – Probability Bayes Rule and use – Belief Networks – Utility Theory – Decision Network – Value of information – Decision Theoretic Agent Design - Higher level agents.

Learning agents – General Model – Inductive learning – Learning Decision Trees – Reinforcement Learning – knowledge in learning – Communicative agents – Types of Communicating agents – Future of AI.

Reference Books
1. Nils.J.Nilsson, Principles of Artificial Intelligence, Narosa Publishing House, 1992.
2. Jeffrey M.Bradshaw, An Introduction to Software Agents, MIT Press, USA 1997.

CA743 AI AND EXPERT SYSTEMS

Problem formulation, Problem Definition – Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics – Specialized production systems.

Problem solving methods – Problem graphs, Matching, Indexing and Heuristic functions – Measure of performance and analysis of search algorithms - Game playing.

Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic.

Structured representation of knowledge - Basic plan generation systems – Strips – Advanced plan generation systems – K strips – D Comp. Expert systems – Architecture - Roles –

Knowledge Acquisition – Meta knowledge, Heuristics - Knowledge representation – Production based system, Frame based system.

Inference – Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning – Certainty factors, Bayesian probability - Strategic explanations – Why, Why not and how explanations. Learning – Machine learning, adaptive learning - Typical expert systems.

Reference Books
1. Elaine Rich, "Artificial Intelligence", 1985, McGraw Hill.
2. Nilsson N.J., "Principles of Artificial Intelligence", 1992, Narosa.

CA744 MARKETING MANAGEMENT

Needs, wants and demands, product, value, satisfaction, marketing and markets - Evolution of marketing.

Buyer behavior: Model, influencing factors, buying decision process, buying roles and buying stages - Segmentation - New Product development - Product Life Cycle – Product positioning and pricing.

Product: Classification, mix decisions and line decisions, branding decisions and packaging - Channel: Nature, function, dynamics, design and management decisions.

Promotion: Advertising decisions – objectives, budget, message, media and evaluation of advertisements. Personal selling – principles. Sales Promotion – objectives and types.

Marketing control: Annual plan control, Profitability control, Efficiency control and strategies control. Marketing strategies: for leaders, followers, challengers, niche players and global markets.

Reference Books
1. Kotler, Philip, Marketing Management: The Millennium edition, PHI pvt. Ltd. New Delhi, 10th edition, 1999.
2. Ramaswamy V.S. and Namakumari .S, "Marketing Management: Planning, implementation and control", Macmillan, New Delhi, 2nd edition, 1997.

CA745 MICROPROCESSORS AND INTERFACING TECHNIQUES

Prerequisites: CA 715

Architecture, Register Organisation, Signal Description, Physical Memory Organisation, I/O Addressing, Special Processor Activities, Minimum and Maximum Mode and Timings - Machine Language Instruction Formats, Addressing modes, Instruction Set , Assembler Directives and Operators.

Simple Programs, Machine Coding the programs, Programming with Assembler, Example Programs - Stack, STACK Structure, Interrupts and Interrupt Service Routines, Interrupt Cycle, Non-maskable Interrupt, Maskable Interrupt, Interrupt Programming, Macros.
Semiconductor Interfacing, Dynamic Ram Interfacing, Interfacing I/O Ports, PIO 8255 - Interfacing Analog to Digital and Digital to Analog Converters.

Programmable Interval Timer 8253, Programmable Interrupt Controller 8259A, Keyboard/Display Controller 8279, Programmable Communication Interface 8251 USART, DMA Controller 8257.DMA Transfers and Operations.

Salient Features of 80286, Internal Architecture of 80286, Signal Descriptions of 80286, Real Addressing Mode, Protected Virtual Address Mode, Protection, Special Operations. Salient Features of 80386, Architecture and Signal Descriptions, Register Organisation, Addressing Modes, Real Address Mode, Protected Mode, Segmentation, Paging, Virtual 8086 Mode.

Reference Books

1. A.K.Ray & K.M.Bhurchandi, Advanced Microprocessors and Peripherals, Tata McGraw-Hill Company Ltd, 2000.
2. Douglas V.Hall, Microprocessors and Interfacing, Tata McGraw Hill, 1997

SEMESTER VI

CA 746 *Project(Industrial) & Viva- Voce Examination*