

MASTER OF COMPUTER APPLICATIONS

SYLLABUS

FOR

CREDIT-BASED CURRICULUM

(Applicable for 2011-2012 batch onwards)



DEPARTMENT OF COMPUTER APPLICATIONS

NATIONAL INSTITUTE OF TECHNOLOGY

TIRUCHIRAPPALLI 620 015

TAMILNADU, INDIA

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI – 620 015.

DEPARTMENT OF COMPUTER APPLICATIONS

MASTER OF COMPUTER APPLICATIONS (CREDIT SYSTEM)

Objective of the Programme:

This programme is structured to enable undergraduate students of any discipline to evolve as Masters in Computer Applications. The programme imparts basic concepts of Computer Science and Applications. The programme also provides for development of comprehensive knowledge and skills to automate systems suitably for the emerging needs in the IT and IT-enabled industries.

Faculty members of the Department

Head

Dr.S.Nickolas

Professors

Dr.N.P.Gopalan

Dr.A.V.Reddy

Dr.B. Ramadoss

Associate Professors

Dr.Michael Arock

Dr.A.Vadivel

Dr.S.R.Balasundaram

Dr.P.J.A.Alphonse

Assistant Professors

Dr.S.Domnic

Dr.B.Janet

Mrs.S.Sangeeta

Ms.R.Eswari

Mr.U.Srinivasulu Reddy

M.C.A. Programme

The total credits required for completing the M.C.A. programme is 103.

SEMESTER I

Subject Code	Subject Name	L	T	P	C
CA711	Problem Solving and Programming	3	1	0	3
CA713	Mathematical Foundations of Computer Applications	3	1	0	3
CA715	Computer Organization and Architecture	3	1	0	3
CA717	Accounting and Financial Management	3	1	0	3
CA719	Business Processes	3	1	0	3
CA701	Programming Lab	0	0	4	2
CA703	Business Communication	0	0	4	2
Total		15	5	8	19

SEMESTER II

Subject Code	Subject Name	L	T	P	C
CA710	Data Structures	3	1	0	3
CA712	Database Management Systems	3	1	0	3
CA714	Computer Networks	3	1	0	3
CA716	Object-oriented Programming	3	1	0	3
CA718	Resource Management Techniques	3	1	0	3
CA702	DBMS Lab	0	0	4	2
CA704	Data Structures Lab	0	0	4	2
Total		15	5	8	19

SEMESTER III

Subject Code	Subject Name	L	T	P	C
CA721	Data Warehousing and Data Mining	3	1	0	3
CA723	Graphics and Multimedia	3	1	0	3
CA725	Software Engineering	3	1	0	3
CA727	Operating Systems	3	1	0	3
CA729	Object-oriented Analysis and Design	3	1	0	3
CA705	OS and Networks Lab	0	0	4	2
CA707	CASE Tools Lab	0	0	4	2
	Total	15	5	8	19

SEMESTER IV

Subject Code	Subject Name	L	T	P	C
CA720	Internet and Java Programming	3	1	0	3
CA722	Information Security	3	1	0	3
CA724	Software Architecture and Project Management	3	1	0	3
CA726	Design and Analysis of Algorithms	3	1	0	3
XXXX	Elective I (from List A)	3	1	0	3
CA706	Java Programming Lab	0	0	4	2
CA708	Information Security Lab	0	0	4	2
	Total	15	5	8	19

SEMESTER V

Subject Code	Subject Name	L	T	P	C
CA731	Web Technology	3	1	0	3
CA733	Distributed Systems	3	1	0	3
XXXX	Elective-II (from List B)	3	1	0	3
XXXX	Elective-III (from List B)	3	1	0	3
XXXX	Elective-IV (from List B)	3	1	0	3
CA709	Web Technology lab	0	0	4	2
CA753	Visual programming Lab	0	0	4	2
	Total	15	5	8	19

SEMESTER VI

Subject Code	Subject Name	L	T	P	C
CA752	Project & Viva-voce Examination	-	-	-	8
	Grand Total	75	25	40	103

ELECTIVES

(All 3-0-0-3)

List A

Subject Code	Course of Study
CA735	Soft Computing
CA736	Unix Internals
CA737	.NET Programming
CA738	Multi-core Programming
CA739	Business Ethics

List B

Subject Code	Course of study
CA740	Organizational Behavior and Personnel Management
CA741	Image Processing
CA742	Network Programming and Security
CA743	Software Agents
CA744	Marketing Management
CA745	Bioinformatics

- CA746 Mobile and Pervasive Computing
- CA747 Modeling and Computer Simulation
- CA748 Grid and Cloud Computing
- CA749 Human Computer Interaction
- CA750 Portfolio Management
- CA 751 Business Intelligence

CA 711 PROBLEM SOLVING AND PROGRAMMING

Objective: To learn problem solving methodologies and aspects of C.

Computers - Definition – Block diagram – Hardware and Software components, Programming paradigms, Program Development Cycle, Evolution of Programming languages. Principles of Structured programming – Sequential, selective and repetitive structures – Examples for each – Modular Programming – Functions and Procedures – Examples – Parameter passing methods.

C Language Fundamentals: Character set – Various constants – Keywords – Primitive data types – Declaration - Syntax for Sequential, selective and repetitive structures – Sample codes for each.

Arrays – Declaration, accessing array elements and initialization- Passing array elements and arrays as arguments - Functions – Definition, call, prototypes, block structure, external variables Storage Classes – *extern* declaration and information hiding.

Pointers – Address and indirection operators, Pointer type declaration, assignment, initialization – Pointer arithmetic – Functions and pointers – Arrays and pointers – Strings and pointers – Multi-dimensional arrays and pointers – Pointer arrays – Pointers to functions – Dynamic memory management.

Structures – Variables, Accessing members, Assignment and nesting – Pointers to Structures – Structures and functions – Structures and arrays – Structures containing pointers – Unions – Bitwise operations – Files – operations – Formatted input/output – character input/output – direct input/output – File positioning and Error handling – An introduction to OpenCL.

REFERENCES

1. J.R. Hanly and E.B. Koffman, “Problem Solving and Program Design in C”, 6th Edition, 2009, Pearson Education.
2. M.A. Vine, “C programming for the absolute beginner”, 2nd Edition, 2008, Thomson Course Technology.
3. B.A. Forouzan and R.F. Gilberg, “Computer Science: A Structured Programming Approach Using C”, 3rd Edition, 2005, Thomson Course Technology.
4. B. Gottfried, “Schaum's Outline of Programming with C”, 2nd Edition, 1996, Tata McGraw Hill.
5. B.W. Kerninghan, D.M. Ritchie, “The C Programming Language”, 2nd Edition, 1995, PHI.
6. R. Tsuchiyama et al, “OpenCL programming book”, 2010, Fixstars Corporation.

CA 713 MATHEMATICAL FOUNDATIONS OF COMPUTER APPLICATIONS

Objective: To learn the relevant mathematical ideas applicable to computers.

Sets - Relations – Posets - Functions - Mathematical Inductions (Simple and strong) – Principles of Counting (Addition & Multiplication).

Graphs - Basic concepts - Isomorphism – complements - Matrix representation of graphs - Trees, Spanning trees, Minimal Spanning tree Algorithms - Euler graphs - Hamiltonian graphs.

Recurrence Relations and Generating Functions - Homogeneous and non-homogeneous recurrences and their solutions - solving recurrences using generating functions.

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.

REFERENCES

1. Thomas Koshy, “Discrete Mathematics with Applications”, 2006, Elsevier.
2. Narsingh Deo, “Graph theory and applications to Engineering and Computer Science”, 1986, PHI.
3. Arthur Gill, “Applied Algebra for the Computer Sciences”, 1976, Prentice Hall.
4. Michael Sipser, “Introduction to Theory of Computation”, 1996, PWS Publishing Co.

CA 715 COMPUTER ORGANIZATION AND ARCHITECTURE

Pre-requisite: Knowledge of fundamentals of Digital Computers

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

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

Memory: Internal - External - Memory Organization - Associative - Cache – Virtual memory.

CPU: Arithmetic And Logic Unit - Instruction Sets - RISC - CISC - Instruction pipeline - Addressing modes and formats - Register organization - Control Unit Operation - Processor organization.

External Devices: I/O modules - Programmed I/O - Interrupt Driven I/O - Direct Memory Access - I/O Channels - Asynchronous Data Transfer.

Processors: Parallel – Array - Vector – Grid – Multi-core – Mobile – Embedded - Cloud computing.

REFERENCES

1. William Stallings, “Computer Organization and Architecture”, 7th Edition, 2006, PHI.
2. M. Morris Mano and Michael D. Ciletti, “Digital Design”, 4th Edition, 2007, Pearson Education.
3. Hennessy J. and Patterson D., “Computer Architecture – A Quantitative Approach”, 1990, Morgan Kaufmann.

CA 717 ACCOUNTING AND FINANCIAL MANAGEMENT

Objective: To learn the fundamentals of 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.

REFERENCES

1. S.N. Maheswari and S.K. Maheswari, “An Introduction to Accountancy”, 8th Edition, 2003, Vikas Publishing, New Delhi.
2. Manmohan and Goyal, “Principles of Management and Accounting”, 5th Edition, 1994, Sahitya Bhawan, Agra.

CA 719 BUSINESS PROCESSES

Objective: To make aware of various business processes and to learn the nuances in them.

Types of Business Organizations - Organizational Structures – Definition – Complexity – Formulization – Size – Technology – Culture - Forms and Outcomes - Explanations of Structures-IT Industry and Organizational Structures-Case Studies.

Organizational Power and Power Outcomes-Leadership and Decision Making-Communication and Organizational Change-Organizational Environments and Effects-Inter and Intra organizational Relationships-Organizational Effectiveness-Case Studies.

Introduction to Business Process Re-engineering (BPR)-Meaning-Types-Process-Impetorative for Survival-Strategic Approach-Implementing Business Process Re-engineering-Methodology and Steps-Indian Scenario of Implementing BPR-Case Studies.

BPR and Information Technology Process-People View and Perspectives-Empowering People through IT-Managing Change in the Global Environment-BPR Rediscovering Indian Paradigm-Need of Reengineering-Case Studies.

E-Business-Introduction-E-business vs. E-commerce-Execution of E-business-Trends-Design for Execution-Construction-Types-Organizational Frame Work and Implementation-E-business Application Areas(CRM, ERP, SCM and Selling)-E-business and India-Case Studies.

REFERENCES

1. Richard H.Hall, “Organizations–Structures, Processes and Outcomes”, 2004, Pearson Education.
2. M.S.Jayaraman et al, “Business Process Reengineering”, 2001, Tata McGraw Hill.
3. Ravi Kalakota and Marcia Robinson, “E-Business; Roadmap for Success”, 2000, Pearson Education.
4. Gareth Jones, “Organizational Theory, Design and Change”, 4th Edition, 2004, Pearson Education.
5. Dave Chaffey, “E-business and E-Commerce”, 2nd Edition, 2003, Pearson Education.

CA701 PROGRAMMING LAB

Exercises for learning basic principles of structured programming with features of C language.

CA703 BUSINESS COMMUNICATION

Objective: To enable and practice modern communication skills.

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.

REFERENCES

1. Simon Sweeney, “English for Communication”, Cambridge University Press.
2. Leo Jones and Richard Alexander, “New International Business English”, Cambridge University Press.

CA 710 DATA STRUCTURES

Objective: To introduce different data structures; searching and sorting techniques and their applications.

Introduction – Arrays – Structures – Stack: Definition and examples, Representing Stacks - Queues and lists: Queue and its Representation, lists – Applications of Stack, Queue and Linked Lists.

Binary Trees – Binary Tree Representations – node representation, internal and external nodes, implicit array representation - Operations on binary trees – Binary tree Traversals - Representing Lists as Binary Trees.

Basic sorting techniques – selection sort, bubble sort, insertion sort and merge sort – Basic Search Techniques – linear search and binary search –Search Trees – Tree searching - Hashing.

Graphs – Representation – Linked representation of Graphs – Graph Traversals – Topological sort - Transitive closure – Single-source shortest path algorithms – Bellman-Ford algorithm and Dijkstra's algorithm.

Advanced data structures – Red-black trees – rotation, insertion and deletion – B-trees – Definition, insertion, deletion – Binomial heaps – operations – Data structures for disjoint sets.

REFERENCES

1. S. Lipschutz and G.A.V. Pai, “Data Structures”, 2010, Tata McGraw-Hill.
2. M.A.Weiss, “Data Structures and Problem Solving using Java”, 4th Edition, 2009, Addison Wesley.
3. P. Brass, “Advanced Data Structures”, 2008, Cambridge University Press.
4. M.J.Augestein, Y.Langsam and A.M. Tenenbaum, “Data Structures using Java”, 2004, Pearson Education.
5. R. Kruse and C.L. Tondo, “Data Structures and Program Design in C”, 2nd Edition, 1996, Prentice Hall.
6. T.A.Standish, “Data structures, Algorithms and Software principles in C”, 1994, Addison Wesley.

CA712 DATABASE MANAGEMENT SYSTEMS

Pre-requisites: Programming Languages – File Concepts

Objective: To learn different database models and design of databases; query languages and transaction management.

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 – 1 to 5 Normal Forms.

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

REFERENCES

1. Raghu Ramakrishnan and Johannes Gehrke, “Data Base Management Systems”, 3rd Edition, 2000, McGraw-Hill.
2. Silberschatz, Korth and Sudarshan, “Data Base System Concepts”, 2002, Tata McGraw Hill.

CA 714 COMPUTER NETWORKS

Objectives: To know about different network architectures and to learn routing protocols, to understand the concepts of data communications, to study the functions of different layers, to introduce IEEE standards employed in computer networking and to make the students to get familiarized with different protocols and network components.

Building a network – Requirements – Network Architecture – OSI – Internet – Direct Link Networks LAN Technology – LAN Architecture – BUS/Tree – Ring – Star – Ethernet – Token Rings – Wireless.

Packet Switching – Switching and Forwarding – Bridges and LAN switches – Internetworking – Simple Internetworking – Routing.

Reliable Byte Stream (TCP) – Simple Demultiplexer (UDP) – TCP Congestion Control – Congestion Avoidance Mechanisms.

Domain Name Service (DNS) – Email - SMTP – MIME – HTTP – SNMP-TELNET-FTP.

Introduction to Network Security – Cryptographic Algorithms: RSA - DES — Applications.

REFERENCES

1. Larry L. Peterson and Bruce S. Davies, “Computer Networks - A systems Approach”, 2nd Edition, 2000, Harcourt Asia/Morgan Kaufmann.
2. James F. Kurose and Keith W. Ross, “Computer Networking - A Top Down Approach”, 5th Edition, 2009, Addison Wesley.
3. William Stallings, “Data and Computer Communications”, 5th Edition, 1997, PHI.
4. Andrew S. Tanenbaum, “Computer Networks”, 4th Edition, 2002, Prentice Hall PTR.
5. Behrouz A. Forouzan, “Data Communications and Networking”, 4th Edition, 2004, McGraw-Hill.

CA716 OBJECT-ORIENTED PROGRAMMING

Objective: To learn the basic principles of object-oriented programming paradigm.

Pre-Requisite: A Procedure-oriented Programming Language

Programming Paradigms - Introduction to OOP – Overview of C++ - Classes – Structures – Union – Friend Functions – Friend Classes – Inline functions – Constructors – Destructors – Parameterized Constructors, Multiple Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructors, Destructor - Static Members – Scope Resolution Operator – Passing objects to functions – Function returning objects-Arrays of Objects, Object as Function Arguments.

Arrays – Pointers – this pointer – References – Dynamic memory Allocation – functions Overloading – Default arguments – Overloading Constructors – Pointers to Functions – Ambiguity in function overloading - Operator Overloading – Members Operator Function – Unary and Binary Overloading - Friend Operator Function – Overloading some special operators like [], (), a and comma operator - Binary Operators - Data Conversion - Pitfalls of Operators Overloading And Conversion - Keywords Explicit And Mutable.

Inheritance – Types of Inheritance – Single- Multiple- Multilevel – Hierarchical – Hybrid – Issues in Inheritance - Protected members – Virtual base Class – Polymorphism – Virtual functions – Pure virtual functions – Applications.

Class templates and generic classes – Function templates and generic functions – Overloading function templates – power of templates – Exception Handling – Derived class Exception – over handling 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 – Overloading << & >> operators, Error handling during file operations, Formatted I/O - STL- Overview-Container Classes Lists-Maps- Algorithms Using Functions and Objects-String Class - Sequence Containers, Iterators, Specialized Iterators, Associative Containers, Storing User-Defined Object, Function Objects.

REFERENCES

1. H. Schildt, “C++ The Complete Reference”, 4th Edition, 2003, Tata McGraw-Hill, New Delhi.
2. J.P. Cohoon and J.W. Davidson, “C++ Program Design – An Introduction to Programming and Object-oriented Design”, 2nd Edition, 1999, Tata McGraw-Hill, New Delhi.
3. Johnston, “C++ programming Today”, 2002, PHI, New Delhi.
4. N Kanthane, “Object Oriented Programming with ANSI & Turbo C++”, 2005, Pearson Education, New Delhi.
5. Farrel, “Object Oriented Programming using C++”, 2nd Edition, 2001, Thomson Learning, Singapore.
6. Bjarne Stroustrup, “The C++ Programming Language”, 3rd Edition, 2000, Addison Wesley.

CA 718 RESOURCE MANAGEMENT TECHNIQUES

Objective: To learn different resource management techniques.

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 – Deterministic Inventory problems with or without shortage cost – Multi-item 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.

REFERENCES

1. H.A. Taha, “Operations Research: An Introduction”, 8th Edition, 2008, Pearson Education.
2. Swarup.K, Gupta and P.K Man Mohan, “Operations Research”, 14th Edition, 2009, Sultan Chand & Sons, New Delhi.

CA702 DBMS LAB

Pre -requisite: CA 712

Exercises / case studies that require table design, normalization and query building.

CA704 DATA STRUCTURES LAB

Pre -requisite: CA 711

Exercises to implement various data structures.

CA721 DATA WAREHOUSING AND DATA MINING

Pre-requisites: CA 719, CA 712, CA 714

Objective: To introduce concepts of data warehousing and data mining techniques.

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.

REFERENCES

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

CA 723 GRAPHICS AND MULTIMEDIA

Pre-requisites: Matrix Theory, Analytical Geometry, Trigonometry

Objectives: To learn different algorithms and transforms related to graphics; to introduce concepts of multimedia.

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 – aSegmenting – Viewport Transformations.

3D Concepts - Projections – Parallel Projection - Perspective Projection – Visible Surface Detection Methods - Three-dimensional Transformations –Visualization and polygon rendering - Hidden Surface Elimination Algorithms.

Multimedia hardware & software - Components of multimedia – Text, Image – Graphics – Audio – Video – Animation – Authoring. Color models – XYZ-RGB-YIQ-CMY-HSV Models.

Multimedia communication systems – Multimedia Information Retrieval – Video conferencing – Virtual reality – Interactive video – video on demand.

REFERENCES

1. Hearn D and Baker M.P, “Computer graphics–C Version”, 2nd Edition, 2004, Pearson Education.
2. Donald Hearn, M. Pauline Baker, “Computer Graphics”, 1992, PHI.
3. Ralf Steinmetz, Klara Steinmetz, “Multimedia Computing, Communications and Applications”, 2004, Pearson Education.
4. Siamon J. Gibbs and Dionysios C. Tsichritzis, “Multimedia programming”, 1995, Addison Wesley.
5. John Villamil, Casanova and Leony Fernandez, Eliar, “Multimedia Graphics”, 1998, PHI.

CA 725 SOFTWARE ENGINEERING

Objective: To introduce the methodologies involved in the development and maintenance of software throughout its life cycle.

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.

Risk Management: Reactive vs. Proactive Risk Strategies – Software Risks – Risk Identification Software Project Planning – Project planning objectives – Project estimation – Decomposition techniques – Empirical estimation models – System Engineering.

Analysis and Design: Concepts and Principles.

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.

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

REFERENCES

1. Roger S. Pressman, "Software Engineering-A practitioner's approach", 6th Edition, 1997, McGraw Hill.
2. Ian Sommerville, Software engineering, 6th Edition, 2000, Pearson education Asia.
3. Pankaj Jalote, “An Integrated Approach to Software Engineering”, 1997, Springer Verlag.
4. James F Peters and Witold Pedryez, “Software Engineering – An Engineering Approach”, 2000, John Wiley and Sons, New Delhi.
5. Ali Behforooz and Frederick J Hudson, “Software Engineering Fundamentals”, 2009, Oxford University Press, New Delhi.

CA 727 OPERATING SYSTEMS

Pre-requisites: Computer Organization and Architecture and Data Structures

Objective: To introduce basic concepts of OS; features of OS with case studies.

Operating System concept- OS Structure –Services-System calls – Process management-Process Concept-Operations on process-Cooperating processes- Inter-process communication-Process scheduling-Scheduling algorithms-Threads- Multithreading models.

Process synchronization- critical-section problem – Synchronization hardware – Semaphores – Classic problems of synchronization – critical regions – Monitors Deadlock-Deadlock characterization – Methods for handling deadlocks – Recovery from deadlock

Memory management-Buddy system-Paging-segmentation-Virtual Memory –Demand paging-Page replacement algorithms – Allocation of frames – Thrashing-Working set model.

Files and Directories - Files System structure- Implementation –File allocation methods-Free space management. I/O systems – I/O interface –Kernel I/O subsystem. Disk scheduling algorithms- Disk management-Swap space management.

Protection and security. Case Study-Linux Operating system-The Linux Kernel-Design principles-Scheduling-Memory management-Files system-Input and Output- Inter process communication-Security

REFERENCES

1. Silberschatz, Galvin and Gagne, “Operating System Concepts”, 6th Edition, 2003, John Wiley & Sons Inc.
2. Andrew S. Tanenbaum, “Modern Operating Systems”, 3rd Edition, 2007, Prentice-Hall of India.
3. Sibsankar Haldar, Alex A.Aravind, “Operating systems”, 2009, Pearson Education.

CA729 OBJECT-ORIENTED ANALYSIS AND DESIGN

Pre – requisites: Procedure Oriented System Development

Objectives: To introduce and describe the object-oriented software development process, including object-oriented methodologies and workflows, tTo make students to analyze system requirements to determine the use cases and domain model of the problem domain and to design real-world applications using OO principles.

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.

Methodology – Modeling and UML – Rumbaugh’s Method – Booch Method – Jacobson et al Method – Comparisons – UML – Static-Dynamic Models – Diagrams – Use Cases.

OO Design Process and Design Axioms – Designing Classes – Object Storage – Interoperability – View Layer Interface

Process of design, design principles, architectural patterns, design document, difficulties and risks in design - Frameworks: reusable subsystem. Design patterns – Singleton, observer, adapter, Façade, proxy with examples. - Pattern Categories - Relationships between patterns - Pattern descriptions – Patterns based Applications – Object Oriented Testing.

Object Oriented Database - Relational Database Design – Mapping Object Models to tables - OODB Features - OO Data Model, Complex Object, Persistence, Transaction, Concurrency Control, OODB Architecture, Query Language for OO Relational Databases, Gemstone / O2 / Orion

REFERENCES

1. Grady Booch et al, “Object-Oriented Analysis and Design with Applications”, 3rd Edition, Pearson, 2007.
2. Grady Booch, Ivar Jacobson, and James Rumbaugh, “UML user guide”, 2005, Addison Wesley Professional.
3. Michael Blaha and James Rumbaugh, “Object-Oriented Modeling and Design with UML”, 2nd Edition, 2005, Pearson Education.
4. E. Gamma, R. Helm, R. Johnson, J. Vlissides, “Design Patterns- Elements of Reusable Object-Oriented Software”, 1995, Addison-Wesley.
5. Ali Bahrami, “Object Oriented Systems Development”, 1999, McGraw Hill.

CA705 OS AND NETWORKS LAB

Pre-requisites: CA 716

Exercises to learn various commands in prevailing operating systems and implement scheduling and the like algorithms; to learn networking principles.

CA707 CASE TOOLS LAB

Pre-requisites: CA 729

Exercises to learn tools for – System Analysis, Design (DFD, ERD, Class Diagrams etc.) – Testing – Configuration Management – Project Management

CA720 INTERNET AND JAVA PROGRAMMING

Pre-requisite: CA 729

Objectives: To introduce the concepts, techniques, protocols related to internet technology, to deal with various services and supporting tools for internet applications, to introduce various concepts of Java for developing general purpose, object oriented, network enabled and multithreaded applications, and to build client-server and distributed applications using Java.

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 – Gopher, WAIS applications – Mail and its types – Remote access and Transactions.

Services, Searchers, Browsers: Directory Services, Finger, WAIS, Whois, DNS, Net Find, X500 – DHCP, X500 Directory Services, LDAP, Internet Security- 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 - J2EE Architecture – Beans Based Applications.

Internetworking Architectures and Applications - Examples in Servlets and RMI - Database Handling – Mobile and Wireless Applications.

REFERENCES

1. Comer, D. “Internetworking with TCP/IP: Principles, Protocols and Architecture”, 4th Edition, Vol.1, 2002, PHI, New Delhi.
2. Bruce Eckel, “Thinking in Java”, 3rd Edition, 2003, Pearson Education.
3. Elliotte Rusty Harold, “Java Network Programming”, 2003, O’Reilly.
4. Deitel and Deitel, “Internet and WWW- How to Program?”, 2000, Prentice Hall.
5. Patric Naughton and Herbert Schildt, “Java2 Complete Reference”, 1999, Tata McGraw Hill.
6. Jim Waldo, “Java: The Good Parts”, 2010, O’Reily.

CA722 INFORMATION SECURITY

Objective: To study the critical need for ensuring Information Security in Organizations

History, What is Information Security?, Critical Characteristics of Information, NISTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues.

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk.

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity.

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

REFERENCES

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", 2003, Vikas Publishing House, New Delhi.
2. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol. 1-3, 2004, CRC Press LLC.
3. Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", 2003, Tata McGraw-Hill.
4. Matt Bishop, "Computer Security Art and Science", 2002, Pearson/PHI.

CA724 SOFTWARE ARCHITECTURE AND SOFTWARE PROJECT MANAGEMENT

Objective: To introduce software architecture aspects for designing complex softwares and learn CMM models and project management techniques.

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.

Product, Process and Project – Definition – Product Life Cycle – Project Life Cycle Models.

Format Process Models And Their Use -Definition and Format model for a process – The ISO 9001 and CMM Models and their relevance to Project Management – Other Emerging Models like People CMM-Metrics – Configuration Management – Software Quality Assurance – Risk Analysis.

Engineering And People Issues In Project Management-Phases (Requirements, Design, Development, Testing, Maintenance, Deployment) –Engineering Activities and Management Issues in Each Phase – Special Considerations in Project Management for India and Geographical Distribution Issues.

REFERENCES

1. Len Bass, Paul Clements and Rick Kazman, “Software Architecture in Practice”, 2nd Edition, 2003, Addison-Wesley Longman, Inc., Reading, MA.
2. Jacobson, Ivar, Griss, Martin, Jonsson, and Patrik, “Software Reuse, Architecture, Process and Organization for Business Success”, 1997, Addison-Wesley Longman, Inc.
3. Ramesh and Gopalaswamy, "Managing Global Projects", 2001, Tata McGraw Hill.
4. Humphrey and Watts, “Managing the Software Process”, 1986, Addison Wesley.
5. Bob Hughes and Mike Cotterell, “Software Project Management”, 4th Edition, 2005, McGraw Hill.

CA 726 DESIGN AND ANALYSIS OF ALGORITHMS

Objective: To introduce complexity finding methods and various algorithmic design methodologies.

Algorithms – Algorithms as technology – Analyzing and Designing algorithms – Asymptotic notations – Recurrences – Methods to solve recurrences – Heap Sort - Quick Sort – Sorting in linear time – Radix sort – Selection in linear time.

Divide and conquer methodology – Multiplication of large integers – Strassen's matrix multiplication – Greedy method – Prim's algorithm – Kruskal's algorithm – algorithm for Huffman codes.

Dynamic Programming – Its elements – Matrix-chain multiplication – Computing a binomial coefficient – Floyd-Warshall algorithm – Optimal binary search tree – Memory functions.

Backtracking – N-Queens problem – Hamiltonian circuit problem – Subset sum problem – Branch and bound – Assignment problem – Knapsack problem – Traveling salesman problem.

NP-hard and NP-complete problems – Definitions and Properties – Reducibility – Cook's Theorem (without proof) – Clique decision problem – Node cover problem – K-coloring problem.

REFERENCES

1. A. Levitin, "Introduction to the Design and Analysis of Algorithms", 2nd edition, 2006, Pearson Education.
2. T.H.Cormen, C.E.Leiserson, R.L.Rivest and C. Stein, "Introduction to algorithms", 3rd edition, 2009, MIT Press.
3. R. Sedgewick and k. Wayne, "Algorithms", 4th Edition, 2011, Addison-Wesley.
4. M.T. Goodrich and R.Tamassia, "Data Structures and Algorithms in Java", 5th edition, 2010, Wiley.
5. A.Drozdek, "Data Structures and Algorithms in Java", 3rd edition, 2008, Cengage Learning Asia.
6. E.Horowitz, S.Sahni, and S.Rajasekaran, "Computer Algorithms", 2nd edition, 2007, Silicon Press.

CA706 JAVA PROGRAMMING LAB

Pre-requisite: CA 720

Exercises / case studies that require object-oriented, Internet and GUI based applications in JAVA.

CA708 INFORMATION SECURITY LAB

Exercises to learn information security related programming.

CA731 WEB TECHNOLOGY

Pre-requisites: CA 729, CA 720

Objectives: To introduce the basic elements and activities of World Wide Web Consortium, to design effective web applications including portals, e-commerce sites etc., to introduce features of mark up languages such as HTML, XML etc., to build applications using scripting – client side as well as server side and to introduce the powerful components of web technologies such as PHP, AJAX etc.

W3C Activities – Web Essentials - Markup Languages – HTML - List, Table, Frame, Form Tags with their usage – Creation and Design of Static and Dynamic Web Pages – Web Design characteristics.

Dynamic Web Applications– JavaScript: Basics, Statements, Hierarchy of Objects - Methods, Properties – Event Handling – Integrating JavaScript with various elements of HTML – Cookies – JSON – Applications.

Server Side Scripting – Perl Overview – Perl with CGI – Background – Working Features – Simple applications – JSP – Objects and Components – ASP – Objects and Components.

XML – DTD - XSL – XLINK – XPATH – XPOINTER – Namespaces – Applications – Integrating XML with other applications – XML Based Languages – Semantic Web Overview.

PHP – Basic Elements – Advanced Features : Files, Sessions, Cookies, Exceptions, Database – AJAX - Introduction – XMLHttpRequest – Database – Integration with other technologies - E-Commerce – Architectures – Applications – Web Services – Architecture – Components – Applications.

REFERENCES

1. Danny Goodman, Michael Morrison, Paul Novitski and Cynthia Gustaff Rayl, “Javascript Bible”, 2009, John Wiley & Sons.
2. Jeffrey C.Jakson, “Web Technologies”, 2008, Pearson Education.
3. Chris Bates, “Web Programming-Building Internet Applications”, 2004, John Wiley & Sons.
4. Huge Williams and David Lane, “Web Database Applications with PHP and MySQL”, 2004, O’Reilly.
5. Watrall and Jeff Siarto, “Head First Web Design: A Brain Friendly Guide”, 2009, O’Reilly.
6. Janice Reynolds, “The Complete E-Commerce Book, Second Edition: Design, Build and Maintain a Successful Web-based Business”, 2004, CMP Books.

CA 733 DISTRIBUTED SYSTEMS

Pre-requisites: Operating Systems, Data Communication, Java or C++ programming language.

Objectives: To understand the concept of distributed systems, to get the knowledge of distributed file systems and web based systems and to understand the issues involved in the design of distributed systems.

Distributed Systems - Goals, Types, Challenges, Architectural models, Inter-process communication – client server communication, group communication, RPC, RMI, Message oriented communication, Stream oriented communication.

Processes - Threads, Virtualization in Distributed Systems, Clients, Servers, Code Migration, Software agents, Naming, Synchronization in distributed systems, Distributed mutual exclusion.

Security – Threats, Policies, Mechanisms, Fault tolerance-Distributed Commit Protocols, Distributed transactions.

Distributed object-based systems – CORBA, DCOM, Distributed Globe, Distributed File Systems – SUN Network File Systems, CODA file systems.

Distributed document-based systems – World Wide Web, Lotus notes, Distributed Coordination based systems – Introduction, TIB / RENDEZVOUS, JINI.

REFERENCES

1. Andrew S. Tanenbaum and Maarten Van Steen, “Distributed System Principles and Paradigms”, 2002, Pearson education.
2. G Coulouris, J. Dollimore and T. Kindberg, “Distributed System Concepts and Design”, 4th Edition, 2005, Addison Wesley.
3. M.L.Liu, “Distributed Computing Principles and Applications”, 2004, Pearson Addison Wesley.
4. Hagit Attiya and Jennifer Welch, “Distributed Computing: Fundamentals, Simulations and Advanced Topics”, 2004, Wiley.
5. S.Mullender, “Distributed Systems”, 2nd Edition, 1993, Addison Wesley.
6. Ajay D. Kshamakalyani and Mukesh Singhal, “Distributed Computing Principles, Algorithms and Systems”, 2008, Cambridge.
7. Arno Puder, Kay Romer and Franc Pilhof, “Distributed Systems Architecture: A middleware approach”, 2006, Elsevier.

CA709 WEB TECHNOLOGY LAB

Pre-requisite: CA 731

Exercises / case studies on HTML, XML, PHP, JSP etc. – Designing web portals.

CA 753 VISUAL PROGRAMMING LAB

Exercises to learn programming in VB/C#, ASP.NET language

CA736 UNIX INTERNALS

Objectives: To get the knowledge of kernel, to understand the file organization and memory management and to have the knowledge of process architecture and its communication methods.

UNIX Operating System – History and goals – BSD, system structure, user perspective, OS services, Hardware, Kernel – Architecture, System concepts, Buffer cache – Headers, Buffer pool, Reading and Writing scenarios.

File Systems – Inodes, Directories, Conversion of a path name to an Inode, Super block, Inode assignment, Allocation of Disk blocks, Other file types, System calls for the file system.

Processes – Structure, Abstraction, Process control – Shell, System Boot and the INIT process, Process scheduling – System calls for time, Clock, Threads and Lightweight processes.

Memory Management – Policies – Swapping, Demand paging, Hybrid System, Kernel Memory Management, I/O System – I/O mapping from User to Device, Driver Interfaces, Disk Drivers, Terminal Drivers, Streams.

Inter-process Communication – Process tracing, System V IPC, Mach IPC, Sockets, Multiprocessor systems – Problems and Solutions, Tunix System, Performance limitations, Distributed UNIX Systems.

RERERENCES

1. Maurice J. Bach, “The Design of the Unix Operating System”, 1999, Pearson Education.
2. Uresh Vahalia, “Unix Internals: The New Frontiers”, 1996, Pearson Education.
3. Marshall K. McKusick, Keith Bostic, Michael J. Jerals, and John S. Quarterman, “The Design And Implementation of the 4.4 BSD Operating System”, 2nd Edition, 1996, Addison Wesley.
4. B. Goodheart, J. Cox, “The Magic Garden Explained”, 1986, Prentice Hall of India.

CA 735 SOFT COMPUTING

Objectives: To introduce the techniques of soft computing and hybridization of soft computing systems which differ from conventional AI and computing in terms of its tolerance to imprecision and uncertainty.

Soft Computing and its Techniques, Soft Computing verses Hard Computing. Applications of Soft Computing in the current industry - Fuzzy Sets, Operations on Fuzzy sets, Fuzzy Relations, Fuzzy Measures, Applications of Fuzzy Set Theory to different branches of Science and Engineering.

Neural Network (NN), Biological foundation of Neural Network, Neural Model and Network Architectures, Perceptron Learning, Supervised Hebbian Learning, Back-propagation, Associative Learning, Competitive Networks, Hopfield Network, Computing with Neural Nets and applications of Neural Network.

Genetic Algorithms (GA) and evolutionary computing, Biological foundation of Genetic Algorithms, General steps in GA, Genetic Operations: cloning, crossover and mutation, Encoding and Selection techniques, Mathematical foundation and Schemata, Holland Schemata theorem, design and implementation of GA, issues in implementation of GA, applications of GA, Classifier systems, Genetic programming, new trends in GA.

Swarm Intelligence (SI), Biological foundation of SI, SI Techniques: Ant Colony Optimization (ACO) and Particle Swarm optimization (PSO). General steps in ACO, the "Invisible Manager" (Stigmergy), the Pheromone, Ant Colonies and Optimization, Ant Colonies and Clustering,

Applications of Ant Colony Optimization. PSO: Social Network Structure: The Neighborhood Principle, PSO Algorithm, Fitness Calculation, Convergence, PSO System Parameters, Particle Swarm Optimization versus Evolutionary Computing and Applications of PSO.

Neuro – Fuzzy and Soft Computing, Adaptive Neuro-Fuzzy Inference System Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum. Hybridization of other techniques.

REFERENCES

1. J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, 2004, PHI.
2. M. Mitchell, “An introduction to Genetic Algorithms”, 1998, Prentice-Hall.
3. D. E. Goldberg, “Genetic Algorithms in Search, Optimization, and Machine Learning”, 1989, Addison Wesley.
4. J. Freeman and D. Skapura, “Neural Networks: Algorithms, Applications, and Programming Techniques”, 1991, Addison-Wesley.
5. G. J. Klir, and B. Yuan, “Fuzzy Sets and Fuzzy Logic: Theory and Applications”, 1995, Prentice-Hall.
6. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, 2003, PHI.
7. R.Eberhart, P.Simpson and R.Dobbins, “Computational Intelligence - PC Tools”, 1996, AP Professional, Boston.

CA737 .NET PROGRAMMING

Pre-requisites: A programming language, CA 712, CA 716, CA 729.

Objectives: To understand the principles of graphical user interface design, to enable a student to develop business applications using .NET and to develop web site and web service using ASP.NET.

Visual programming principles – GUI Design - User-centered Design - Navigation -Accessibility - Structure - Elements- Visual hierarchy – Typography – Graphics – Animation – Creative design.

.NET Framework - Architecture, Common Language Runtime, Common Type System, Namespaces, Assemblies, Memory Management, Process Management, Class Libraries.

.NET - Declaration, Expressions, Control Structures, Function, String, Array, Class, Property, Indexer, Delegate, Encapsulation, Inheritance, Polymorphism, Interface, Exception Handling, , Module, Graphics, File handling and Data Access.

.NET – Form- Event - common controls - container – menu – toolbar – data component - printing – reporting – control arrays – dialogs – single and multiple document interface.

ASP.NET – Anatomy of web Page - Web Forms, Controls- Data, Standard, Validation, HTML, Navigation, Login, Reports - Master Pages – Application - Web Service Architecture - Basic Web Services – Web Reference – Standards.

RERERENCES

1. Matt J. Crouch, “ASP.NET and VB. NET Web Programming”, 2006, Pearson Education.
2. Kevin Hoffman, “Microsoft Visual C# 2005 Unleashed”, 2006, Pearson Education.
3. Sandeep Chatterjee and Janes Webber, “Developing Enterprise Web Services: An Architect’s Guide”, 2005, Pearson Education.
4. Wilbert O. Galitz, “The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques”, 2007, Wiley Desktop Editions.

CA738 MULTI-CORE PROGRAMMING

Objective: To learn different multi-core programming techniques.

Multi-core – Definition and hybrid architectures – The software developer’s viewpoint – the bus connection – from single core to multi-core – Four effective multi-core designs.

Challenges of multi-core programming – Sequential model – definition – Concurrency – Definition – challenges pertaining to software development – Processor architecture challenges – Operating system’s role.

Process – Definition – Process creation – working with process Environment Variables – killing a process – process- resources- synchronous and asynchronous processes –Multithreading – Comparing threads to processes – Architecture of a thread- creation and management of threads.

Communication and synchronization – synchronizing concurrency – Thread strategy approaches – Decomposition and encapsulation of work- Approaches to application design – PADL and PBS.

UML – modeling the structure of a system – UML and concurrent behavior – Basic testing types – Defect removal for parallel programs – Standard software engineering tests – Introduction to parallelization – OpenCL overview, setup and Basics.

REFERENCES

1. M. Herlihy and N. Shavit, “The Art of Multiprocessor Programming”, 2008, Morgan Kaufmann.

2. D.B.Kirk and W.W.Hwu, “Programming Massively Parallel Processors: A Hands-on Approach”, 2010, Morgan Kaufmann.
3. C.Huges and T.Huges, “Professional Multi-core Programming: Design and Implementation for C++ Developers”, 2008, Wrox.
4. R. Tsuchiyama et al, “OpenCL programming book”, 2010, Fixstars Corporation.

CA739 BUSINESS ETHICS

Objective: To introduce business ethics and its practices.

Introduction to Business Ethics, Ethics, Morals and Values, Concepts of Utilitarianism and Universalism – Theory of rights, theory of Justice – Virtue ethics – ethics of care– Law and Ethics – The Nature of Ethics in management – Business Standards and Values – Value Orientation of the Firm.

Environmental Pollution and Society - Marketing Ethics (in Products, Pricing, Promotion and Place) and Consumer protection – Ethics in Human Resources management (Recruitment and promotion policies, Working Conditions, Down Sizing Workforce), Ethical issues at the top management, Ethics in financial markets and investor protection – Ethical responsibility towards competitors and business partners.

A Historical Perspective from Industrial Revolution to Social Activism – Current CSR practices of the firms in India and abroad. Conflicts in decision making from ethical and economic point of view - Ethical Dilemma - Solving ethical dilemma -Managerial integrity and decision making.

Personal Integrity and self development – wisdom based leadership.

History of Corporate form and models - Corporate Objectives and goals, Ownership pattern – Issues in managing public limited firms – Agency problems.

REFERENCES

1. M. G. Velasquez, “Business Ethics: Concepts and Cases”, 2005, Prentice Hall of India.
2. N. Minow and R. Monks, “Corporate Governance”, 2008, Wiley-Blackwell.
3. E. Banks, “Corporate Governance: Financial Responsibility, Ethics and Controls”, 2004, Palgrave Macmillan.

CA740 ORGANIZATIONAL BEHAVIOR AND PERSONNEL MANAGEMENT

Objective: To learn fundamental principles of organizational behavior.

Organizational Behavior – The human relations movement, The Hawthorne studies, Models for organizational behavior – Management concepts.

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 - Individual conflict, Interpersonal conflict, Inter-group behavior and conflict - Leadership – style.

Personnel Function: Evaluation, objectives, principles, philosophies and policies, duties and responsibilities of the manager, position of the personnel department in the organization, line and staff relationship.

Manpower planning: Uses benefits problems and limitations, manpower, inventory, manpower forecasting, job description, recruitment, job specification and job selection interviewing techniques, transfers, promotion and its policies.

REFERENCES

1. Stephen P. Robbins and Timothy A. Judge, “Organizational Behavior”, 14th Edition, 2010, Prentice Hall.
2. Robert Kreitner and Angelo Kinicki, “Organizational Behavior”, 8th Edition, 2007, McGraw-Hill.
3. Fred Luthans, "Organizational Behavior", 1977, McGraw Hill.
4. Keith Davis, "Human behavior at work: Human relations and Organizational Behavior", 1982, Tata McGraw Hill, New Delhi.
5. Rudrabasavaraj M.N. “Dynamic personnel Administration”, 3rd Edition, 2011, Himalaya Publishing House, Bombay.

CA741 IMAGE PROCESSING

Objective: To learn different fundamentals of image processing.

Digital image fundamentals– Image Representation – Sampling and Quantization – Relationships between pixels – Imaging Geometry- Image transforms – Fourier- Discrete Fourier-Fast Fourier- Discrete Cosine- Walsh- Hadamard -Haar -Slant – Karhunen – Loeve Transforms.

Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging –Smoothing and Sharpening: Spatial filters –Frequency Domain methods: Smoothing and Sharpening Frequency domain filters.

Model of Image Degradation/restoration process – Noise models – Spatial filtering -Inverse filtering -Least mean square filtering – Constrained least mean square filtering – Geometric mean filter.

Lossless compression: Variable length coding – LZW coding – Bit plane coding- predictive coding-DPCM-Lossy Compression: Transform coding – Wavelet coding – Basics of Image compression standards: JPEG, MPEG, Basics of Vector quantization.

Edge detection – Thresholding – Region-based segmentation – Boundary representation: chain codes - Polygonal approximation – Boundary segments – boundary descriptors: Simple descriptors-Fourier descriptors - Regional descriptors –Simple descriptors - Texture.

REFERENCES

1. R. Gonzalez and R. E. Wood, “Digital Image Processing”, 3rd Edition, 2008, Pearson Education, India.
2. A.K. Jain, “Fundamentals of Digital Image Processing”, 2010, PHI.

CA742 NETWORK PROGRAMMING AND SECURITY

Objectives: To learn the basics of socket programming and network security issues and algorithms.

Introduction to Socket Programming – Overview of TCP/IP Protocols –Introduction to Sockets – Socket address Structures – Byte ordering functions – address conversion functions – Elementary TCP Sockets – socket, connect, bind, listen, accept, read, write, close functions – Iterative Server – Concurrent Server.

Socket options – getsocket and setsocket functions – generic socket options – IP socket options – ICMP socket options – TCP socket options – Elementary UDP sockets – UDP echo Server – UDP echo Client – Multiplexing TCP and UDP sockets – Domain name system – gethostbyname function – Ipv6 support in DNS – gethostbyadr function – getservbyname and getservbyport functions.

Introduction -Motivating examples- Basic concepts: confidentiality, integrity, availability, security policies, security mechanisms, assurance- Basic Cryptography - Historical background, Transposition/Substitution, Caesar Cipher- Introduction to Symmetric crypto primitives, Asymmetric crypto primitives, and Hash functions - Secret Key Cryptography – Applications, Data Encryption Standard (DES),Encrypting large messages (ECB, CBC, OFB, CFB, CTR), Multiple Encryption DES (EDE)- Message Digests-Applications, Strong and weak collision resistance, The Birthday Paradox, MD5, SHA-1.

Applications, Theory: Euclidean algorithm, Euler Theorem, Fermat Theorem, Totent functions, multiplicative and additive inverse- RSA, Selection of public and private keys- Authentication- Security Handshake pitfalls, Online vs. offline password guessing, Reflection attacks, Per-session keys and authentication tickets, Key distribution centers and certificate authorities- Trusted Intermediaries- Public Key infrastructures, Certification authorities and key distribution centers, Kerberos.

Introduction to TCP/IP protocol stack, Implementation layers for security protocols and implications, IPsec: AH and ESP, IPsec: IKE,SSL/TLS - Electronic Mail Security-o Distribution lists, Establishing keys, Privacy, source authentication, message integrity, non-repudiation, proof of submission, proof of delivery, message flow confidentiality, anonymity, Pretty Good Privacy (PGP)- Firewalls and Web Security ,Packet filters, Application level gateways, Encrypted tunnels, Cookies, Web security problems.

REFERENCES

1. W. Richard Stevens, “Unix Network Programming”, Vol. 1, 2nd Edition, 1998, PHI Pearson Education. (Units – I, II, III & IV.) (Chapter – 1-10, 23, 25).
2. William Stallings, “SNMP, SNMPv2, SNMPv3 and RMON 1 and 2”, 3rd Edition, 1999, Addison Wesley.
3. D.E. Comer, “Intrenetworking with TCP/IP – Vol.- III”, (BSD Sockets Version), 2nd Edition, 2003, PHI.
4. Charlie Kaufman, Radia Perlman, and Mike Speciner, “Network Security: Private Communication in a Public World”, 2002, Prentice Hall.
5. Atul Kahate, “Cryptography and Network Security”, 2007, McGraw Hill.

CA743 SOFTWARE AGENTS

Pre-requisites: CA 714, CA 719

Objective: To introduce concepts and types of software agents and their applications.

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.

REFERENCES

1. Nils.J.Nilsson, “Principles of Artificial Intelligence”, 1992, Narosa Publishing House.
2. Jeffrey M.Bradshaw, “An Introduction to Software Agents”, 1997, MIT Press, USA.
3. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, 2nd Edition, 2004, Pearson Education.

CA744 MARKETING MANAGEMENT

Objective: To introduce concepts of 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.

REFERENCES

1. Philip Kotler, “Marketing Management”, 14th Edition, 2011, Pearson Prentice Hall.
2. Ramaswamy V.S. and Namakumari .S, “Marketing Management: Planning, implementation and control”, 2nd Edition, 1997, Macmillan, New Delhi.

CA745 BIOINFORMATICS

Objectives: To make students understand Genomic data acquisition and analysis, comparative and predictive analysis of DNA and protein sequence, Phylogenetic inference etc.

Introduction to bioinformatics, classification of biological databases, Biological data formats, application of bioinformatics in various fields. Introduction to single letter code of amino acids, symbols used in nucleotides, data retrieval – Entrez and SRS.

Introduction to Sequence alignment, Substitution matrices, Scoring matrices – PAM and BLOSUM. Local and Global alignment concepts, dot plot, dynamic programming methodology, Multiple sequence alignment –Progressive alignment. Database searches for homologous sequences –FASTA AND BLAST versions.

Evolutionary analysis: distances - clustering methods – rooted and unrooted tree representation – Bootstrapping strategies.

Fragment assembly-Genome sequence assembly - Gene finding method, Gene prediction - Analysis and prediction of regulatory regions.

Concepts and secondary structure prediction –Probabilistic models: Markov chain, Hidden Markov Models -Gene identification and other applications.

REFERENCES

1. Andreqas D. Baxevanis, B. F. Francis Ouellette, “Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins”, 1998, John Wiley and Sons.
2. Shanmughavel, P., “Principles of Bioinformatics”, 2005, Pointer Publishers, Jaipur, India.
3. Richard Durbin, Sean Eddy, Anders Krogh, and Graeme Mitchison, “Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids”, 1998, Cambridge University Press.
4. Bishop M.J., Rawlings C.J. (Eds.), “DNA and protein sequence analysis: A Practical Approach”, 1997, IRL Press, Oxford.
5. Doolittle R.F. (Ed.), “Computer methods for macromolecular sequence analysis (Methods in Enzymology”, Vol. 266, 1996, Academic Press, San Diego.

CA 746 MOBILE AND PERVASIVE COMPUTING

Objective: To introduce concepts of mobile computing and to learn concepts of pervasive computing and protocols.

Introduction: Mobile Computing – Networks – Middleware and Gateways – Developing Mobile Computing Applications – Mobile Computing Architecture: Architecture for Mobile Computing – Three-Tier Architecture – Design Considerations for Mobile Computing – Mobile Computing through Internet – Making Existing Applications Mobile Enabled – Mobile Computing through Telephone – Developing an IVR Application – Emerging Technologies: - Bluetooth – RFID - Wireless Broadband (WiMax) - Mobile IP.

Global System for Mobile Communications – GSM Architecture – GSM Entities - Call Routing in GSM – GSM Addresses and Identifiers – Network Aspects in GSM – GSM Frequency Allocation – Authentication and Security- Short Message Service (SMS)- Mobile Computing Over SMS – Value Added Services through SMS – GPRS- GPRS and Packet Data Network –

GPRS Network Architecture – GPRS Network Operations –Data Services in GPRS- Applications for GPRS – Limitations of GPRS – CDMA and 3G- Spread Spectrum Technology- CDMA Versus GSM – Wireless Data – Third Generation Networks – Applications on 3G.

Relationship of Wireless Computing- ubiquitous computing- Internet computing- Related ideas: Ambient computing- Elements of Pervasive architecture- Requirements of computational infrastructure. Failure management- General issues: Security, performance, dependability, Web architectures. Local networks - Store and forward, multi-network architectures.

Device and network technologies, Devices categories, Devices characteristic Heterogeneity and Interoperability. Mobile Agents, device management. Language localization issues for mobile devices. User Interface design issues for mobile devices, Difference between UI design for mobile devices and conventional systems, mobile device technology study: Windows CE, Symbian, J2ME, Pocket PC, BREW technologies and devices.

Introduction to Sensor networks- Types of sensor networks. Berkeley Motes. Sensor network organization. Sensor network routing mechanisms. Platforms for Wireless sensor networks, sensor node architecture, sensor network architecture. RFID: Introduction, transponder and reader architecture. Types of tags and readers. Frequencies of operation. Selection criteria for RFID systems. Information processing in the transponder and reader. Fundamental operating principles. Antennas for RFIDs.

REFERENCES

For UNIT I and II

1. Ashok K. Talukder and Roopa R. Yuvagal, “Mobile Computing”, 2005, Tata McGraw Hill.
2. James Keogh, “J2ME: The Complete Reference”, 2003, Tata McGraw-Hill.

For Unit III, IV and V

3. Burkhardt, Henn, Hepper, Rindtorff and Schaeck, “Pervasive computing”, 2002, Addison Wesley.
4. F.Adelstein and S.K.S Gupta, “Fundamentals of Mobile and Pervasive Computing”, 2005, TMH.
5. Jochen Burkhardt, Horst Henn, Stefan Heper, Klaus Rindtorff and Thomas Schack, “Pervasive Computing Technology and Architecture of Mobile Internet Applications”, 2002, Addison Wesley.
6. Uwe Hansmann, L. Merk, M. Niclous, T. Stober and U.Hansmann, “Pervasive Computing”, 2003, Springer Verlag.
7. Goldin Richard, “Fundamentals of Mobile and Pervasive Computing”, 2004, McGraw Hill.

CA747 MODELING AND COMPUTER SIMULATION

Prerequisites: Probability Distributions, Any Programming Language.

Objective: To learn different simulation models.

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 - Development of simulation models using simulation language.

RERERENCES

1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol, “Discrete-Event System Simulation”, 4th Edition, 2007, Pearson Education.
2. Lawrence M. Leemis, Stephen K. Park, “Discrete-Event Simulation: A First Course”, 2006, Pearson Education.

CA748 GRID AND CLOUD COMPUTING

Pre-requisite: CA 726

Objective: To introduce concepts of grid and cloud computing.

Introduction to Distributed and High performance Computing: Basic terms: Distributed Computing, HPC, HPCC, Network Computing, Internet Computing, Clusters, Grid and Meta Computing. Basic of Communication models: TCP/IP, ATM, Fast Ethernet.

Virtual Organization and Grid Computing- Grid Anatomy and web Service Architecture – OGSA Architecture: OGSA Platform Components – Open Grid Services Infrastructure.

Resource and service management: Resource management on the Grid - Generalized Resource Management Framework – Grid Resource Management Systems – Service Negotiation and Acquisition protocol. Data Access, Integration, and Management: Data Intensive applications – categories and origins of data – data management challenges – data source services – federation services. Grid Computing Toolkits: GLOBUS Toolkit.

Introduction to Cloud Computing: Cloud Computing Architectural Framework Cloud Deployment Models, Virtualization in Cloud Computing, Parallelization in Cloud Computing, Security for Cloud Computing, Cloud Economics.

Cloud Service Models: Software as a Service (SaaS), Infrastructure as a Service (IaaS), Platform as a Service (PaaS) – Case Studies.

REFERENCES

1. Foster and Kesselman, “The Grid : Blueprint for a New Computing Infrastructure”, 2004, Morgan Kauffman publishers Inc.
2. Joshy Joseph and Craig Fellenstein, “Grid Computing”, 2004, Pearson Education.
3. Coulouris, Dollimore and Kindber, “Distributed System: Concept and Design”, 2000, Addison Wesley.
4. Fran Berman, Geoffrey C. Fox and Anthony J.G.Hey, “Grid Computing”, 2003, John Wiley.
5. Michael Miller, “Cloud Computing”, 2009, Dorling Kindersley India.
6. Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, “Cloud computing: A practical Approach”, 2010, McGraw Hill.

CA749 HUMAN COMPUTER INTERACTION

Objective: To learn various concepts of human computer interaction.

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design - A brief history of Screen design.

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, and understanding business junctions.

Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls – Implementation support - 3D user interfaces – Evaluation and User support – user models – dialog notations and Design – Groupware, ubiquitous computing, Virtual Reality and Multimedia.

REFERENCES

1. Wilbert O. Galitz, “The essential guide to user interface design”, 2nd Edition, 2002, Wiley DreamTech.
2. Ben Shneidermann, “Designing the user interface”, 3rd Edition, 2001, Pearson Education Asia.
3. Dix, A., Finlay, J., Abowd, G., and Beale, R, “Human Computer interaction”, 3rd Edition, 2004, Prentice Hall.

CA750 PORTFOLIO MANAGEMENT

Objective: To impart the basic principles of equity analysis and portfolio management.

Investment - Meaning and process of Investment Management – Speculation Investment Avenues in India.

Risk and Return – Historical and Expected return – Measurement – Risk and its measurement – Systematic and Unsystematic risk – Types – Measurement and significance of Beta.

Security Valuation – Bond, Equity and preference share valuation – Yield to maturity- Bond value theorems.

Fundamental and Technical Analysis – Economy, Industry and Company analysis – Tools for technical analysis.

Portfolio Selection, performance evaluation and portfolio revision- Formula plans – Capital Asset Pricing Model (CAPM)

REFERENCES

1. Kevin.S. “Security Analysis and Portfolio Management”, 2008, PHI.
2. Prasanna Chandra, Investment analysis and portfolio management, 2nd Edition, 2007, Tata McGraw Hill.

CA 751 BUSINESS INTELLIGENCE

Decision Support and Business intelligence - Changing Business environments and computerized decision support, managerial decision making and support for decision making - DSS concept and framework Business intelligence - Major tools and techniques of managerial decision support - BI architectures.

Essentials of Business Intelligence-Origins and drivers of business intelligence, successful BI implementation, characteristics of BI-Architecting the Data, Enterprise Data Model and its Benefits, Granularity of Data in Data Warehouse and Role of Metadata.

Advanced Data Warehousing principles- Data warehousing architectures, DW development, real time DW and DW Administration and security issues-Visualization of Dimension model-Star, snowflake and other advanced models-Aggregated Fact tables -Relational DBMS Support for Dimensional Modeling- Advanced Topics in Dimensional Modeling - Selecting a Modeling Tool - Populating Data Warehouse.

Dimensional modeling in BI environment - Dimensional Modeling - Modeling considerations - Dimensional model design life cycle - Case studies - Business Analytics and data Visualization - Business analytics overview, reports and queries, Advanced business analytics , data visualization, Real time BI, Business analytics and web intelligence - Structure of mathematical models for decision support and visual interactive simulation.

Business performance Management - Business Intelligence Applications: Marketing models, Logistic and production models and Data Development analysis.

REFERENCES

1. E.Turban, J.E. Aronson, T. P. Liang and R. Sharda, “Decision Support and Business Intelligence Systems”, 8th Edition, 2009, Pearson Education.
2. D. Volitich, “IBM Cognos Business Intelligence”, 2008, TMH.
3. C. Ballard, D.Herreman, D.Schau, R. Bell, E. Kim and A. Valencic, “Data Modeling Techniques for Data Warehousing”, 1999, IBM Corporation, International Technical Support Organization.