About us:

The Department of Computer Applications is one of the pioneering departments of the institution that offers Information Technology courses such as MCA and one among the top five offering MCA courses in the country. It is committed to impart quality education in the sub-fields of IT, a field growing in leaps and bounds.

Vision:

Towards a school of Information Science and Technology conforming to international standards

Mission:

- To offer state-of-art education in Information Science and Technology
- To provide strong theoretical foundation complemented with extensive practical training
- To inculcate value-based, socially committed professionalism to the cause of overall development of students and society

MASTER OF COMPUTER APPLICATIONS

Objective of the Programme:

The broad objective of MCA Program is to impart quality education in the Computer Science and its applications. The curriculum has been designed carefully to cater the demands of the IT and ITES sectors and the course provide a strong theoretical foundation through high quality teaching complemented by extensive practical training. It is dedicated to the mission of inculcating value-based, socially committed professionalism to the cause of overall development of students and the society.
The board of studies for Computer Applications Department includes the following members:

- **Chairman:**
  Dr. S. Nickolas  
  Head of the department

- **External Experts:**
  1. Dr. K. Chandrasekar  
     Professor  
     Department of Computer Science & Engineering  
     National Institute of Technology Karnataka, Surathkal
  2. Dr. P. Rajendran  
     Founder and Managing Director  
     Paragon Dynamics Info Systems Pvt. Ltd.  
     Chennai

- **Members:**
  1. Dr. N.P. Gopalan  
  2. Dr. A.V. Reddy  
  3. Dr. B. Ramadoss  
  4. Dr. Michael Arock  
  5. Dr. A.Vadivel  
  6. Dr. S.R.Balasundaram  
  7. Dr. P.J.A Alphonse  
  8. Dr. S. Domnic  
  9. Dr. (Mrs). B.Janet  
  10. Mrs.S. Sangeetha  
  11. Ms. R. Eswari  
  12. Mr. U. Srinivasulu Reddy  
  13. Mr. I. Brem Navas  
  14. Mr. R. Gobi  
  15. Ms. Pragati Priyadharshini
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L: LECTURE | T: TUTORIAL | P: PRACTICAL | C: CREDITS
# LIST OF ELECTIVES

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L: LECTURE | T: TUTORIAL | P: PRACTICAL | C: CREDITS
Objective:
To learn problem solving methodologies and aspects of C programming.

CA711 PROBLEM SOLVING AND PROGRAMMING


C Language Fundamentals: Character set – Constants – Keywords – Primitive data types – Declaration - Sequential, selective and repetitive structures.

Arrays – Declaration, initialization and accessing array elements - Passing array elements and arrays as arguments – Functions: Definition – call – prototypes - block structure - Storage Classes

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


REFERENCES:

Outcome:
Ability to analyze and solve problems systematically and write programs in C.
Objective:
To learn the mathematical foundations applicable to computing.

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


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 -Greibach Normal Form - Push-down Automata - Equivalence of CFL’s and PDA’s - Non-context free languages

REFERENCES:
2. Narsingh Deo, “Graph theory and applications to Engineering and Computer Science”, PHI, 1986.

Outcome:
Ability to apply relevant mathematical ideas and techniques for solving problems.
Objective:
To understand the basic structure of a digital computer and to study the operations of internal components.

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


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.


REFERENCES:

Outcome:
Knowledge about the design and organization of components in computing systems.
CA717 ACCOUNTING AND FINANCIAL MANAGEMENT

Objective:
To learn the fundamentals of accounting and financial management.

Assets – Liabilities – 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:

Outcome:
Ability to understand the functional areas of accounting and financial management.
Objective:
To learn the fundamentals of numerical and statistical methods.


Binomial, poison and Normal Distributions – Fitting of Probability distributions – Correlation and regression – Linear regression – Correlation coefficient – Multiple linear regression

Test of Hypothesis – Testing for Attributes – Mean of Normal Population – One-tailed and two-tailed tests, F-test and Chi-Square test – ANOVA – One way and two way classifications

REFERENCES:

Outcome:
Ability to solve problems using numerical and statistical methods.
CA701 PROGRAMMING IN C LAB

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

The Course aims to:

1. Introduce the dynamics of Communication in the Business world.
2. Help to familiarize and practice the different kinds of communication tools.
3. Give practice in the nuances of spoken communication.
4. Expose to the different forms of Business communication.

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Communication in the Business World: Communication: Concepts and Goals – Theories of communication – Organizational and personal goals. Psychology of communication – Channels and Networks – Barriers to and cost of communication

Listening and Speaking Practice: Message Planning – Purposive Listening – – Familiarizing to different accents and tones – Listening Practice - Oral Communication – Extempore speech practice – Presentation skills – Group Discussion Practice - Interview skills. Telephone strategies

Writing practice: Business Correspondence – Different kinds of written communication in business Organizations - Marketing Language – Creativity and Appeal – Report writing practice

Technology and Communication: Practice in telephone etiquette – Limitations & possibilities of E mail - Use of Power point- Role of mass media in business communication

### REFERENCES:


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### Outcome:

Ability to communicate in the business world using different communication tools
Objective:
To introduce different data structures; searching and sorting techniques and their applications.

Linear data Structures – Arrays, Structures, Linked Lists – Singly, Doubly, Circular, XOR, VList, Skip, Jump List, Stack: Definition and examples, Representing Stacks - Queues: Definition and examples, priority queue, Deque, IRD, ORD – Applications of Stack, Queue and Linked Lists- Hashing

Non-Linear data Structures - Graphs – Representation – Linked representation of Graphs – Graph Traversals - 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


Single-source shortest path algorithms – Bellman-Ford algorithm and Dijkstra's algorithm-Transitive closure -Topological sort

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

REFERENCES:

Outcome:
Ability to select appropriate data structures for solving real time problems.
CA712 DATABASE MANAGEMENT SYSTEMS

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


Database Design – Pitfalls in Relational Database Design – Functional Dependencies – Decomposition – Normalization – I to V Normal Forms


REFERENCES:

Outcome:
Gain knowledge and understanding of the design of a database, models used for structuring data and ability to implement and query the database.
CA714 OPERATING SYSTEMS

Objective:
To introduce basic concepts and features of OS with case study on different operating systems.

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.


Memory management-Buddysystem-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, Windows, Mac OS and Mobile OS

REFERENCES:

Outcome:
Understand the support rendered by operating system in every phase of computer based problem solving.
**Objective:**
To learn the basic principles of object-oriented programming paradigm using C++


Arrays – Pointers – this pointer – References – Dynamic memory Allocation – functions Overloading – Default arguments – Overloading Constructors – Pointers to Functions – Operator Overloading - Type Conversion

Inheritance – Types - Derived Class Constructors- Issues in Inheritance – Virtual base Class – Polymorphism – Virtual functions – Pure virtual functions

Class templates and generic classes – Function templates and generic functions – Overloading function templates – power of templates – Exception Handling – Derived class Exception – over handling generic functions – Exception handling Functions


**REFERENCES:**

**Outcome:**
Ability to apply appropriate object-oriented programming concepts for solving real world problems
Objective:
To learn different resource management techniques.


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

REFERENCES:

Outcome:
Ability to formulate and solve LPP, NLPP, DPP, Inventory and Queuing problems.
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 MINING TECHNIQUES

Objective:
To introduce concepts of data mining techniques and its applications in knowledge extraction from databases.


Data Preprocessing: Summarization - Data cleaning - Data Integration and Transformation - Data Reduction - Discretization and Concept Hierarchy Generation

Mining Frequent Patterns – Frequent Itemset Mining Methods. Classification: Classification by Decision Tree Induction – Bayesian Classification – Rule based Classification - Prediction – Accuracy and Error Measures

Cluster Analysis – Types of Data in Cluster Analysis – Categorization of clustering Methods – Partition Methods - Outlier Analysis – Mining Data Streams – Social Network Analysis – Mining the World Wide Web

Data Warehousing: OLTP Vs OLAP - Multidimensional Data Model -DW Architecture Efficient Processing of OLAP queries - Metadata repository – DWH Implementation - OLAM

REFERENCES:
3. K.P.Soman, ShyamDiwakar, V.Ajay, “Insight into Data Mining Theory & Practice, Prentice Hall India,2012,

Outcome:
Ability to understand Data Mining techniques and usage of data mining and data warehousing tools for analysis of data.
CA723 GRAPHICS AND MULTIMEDIA

**Objective:**
To learn the principles of Graphics Algorithms and Multimedia Techniques


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


Multimedia communication systems – Multimedia Information Retrieval – Video conferencing – Virtual reality

**REFERENCES:**

**Outcome:**
Ability to understand the concepts of graphics and multimedia and to develop animation as well gaming applications.
CA725 SOFTWARE ENGINEERING

Objective:
To impart concepts of a comprehensive study on the theories, processes, methods, and techniques of building high-quality software in cost-effective ways.

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- ethics for software engineers.


Analysis and Design – Design concept and Principles, Methods for traditional, Real time of object oriented systems – Comparisons – Metrics- Quality assurance


REFERENCES:

Outcome:
Ability to know the proven principles/techniques/tools, current standards, and best practices of Software Engineering.
CA727 COMPUTER NETWORKS

**Objective:**
To learn various network architectures and protocols and the functions of different layers in line with IEEE standards.


Error Detection and Correction – VRC – LRC – CRC- Checksum – Hamming Distance for Error Correction – simulator development to capture various packets flowing in the Data Link Layer

Switching - Packet Switching – Switching and Forwarding – Bridges and LAN switches – Internetworking – Simple Internetworking – Routing - Selective routing protocol specification

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

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

**REFERENCES:**

**Outcome:**
Ability to understand the working principle of Computer Networks.

**Industrial Component:**
Simulator development to capture various packets flowing in the Data Link Layer
CA729 DESIGN AND ANALYSIS OF ALGORITHMS

**Objective:**
To learn about Time Complexity and various algorithmic design methodologies.


**REFERENCES:**

**Outcome:**
Ability to design algorithms by applying design strategies and analyze time complexity.
CA705 OS AND NETWORKSLAB

Pre-requisites: CA 714, CA 727

I. Exercises to learn various commands in operating systems and implement OS algorithms
II. Exercises to implement network principles

CA707 GRAPHICS AND MULTIMEDIA LAB

Exercises related to:

- Realizing various graphics algorithms
- Implementing Multimedia coding schemes
CA722 ORGANIZATIONAL BEHAVIOR

Objective:
To learn the leadership skills and group behavior.


Conflicts - Individual conflict, Interpersonal conflict, Inter-group conflict – Conflict Resolution - Negotiation

Foundations of Organization Structure - Organizational Culture – Organizational Dynamics

REFERENCES:

Outcome:
Ability to practice ethical behavior and community responsibilities in organizations and society.

Industrial Component:
A series of tutorials on Organisation development
Objective:
To study the concepts and requirements of Information Security.


Cryptography: Classical Cryptography, Symmetric Cryptography, Public Key (Asymmetric cryptography), Modern Cryptography. Forensics: DRM technology (including watermarking and fingerprinting of images, video and audio), Steganography, Biometrics


Information Security Threats: Viruses, Worms and other malware, Email Threats, Web Threats, RFID, Identity Theft, Data Security Breaches, Hacking Tools and Techniques

REFERENCES:

Outcome:
Ability to understand various cryptography algorithms and the importance of information security.

Industrial components:

Expert Lecture on Security Related Issues from Ethical Hackers.
CA726 DISTRIBUTED TECHNOLOGY

**Objective:**

To learn the various distributed objects and technologies.

**Introduction**

- Different Forms of Computing
- Architecture
- Inter-process Communications: IPC
- Program Interface
- Event Synchronization
- Timeouts and Threading
- Deadlocks and Timeouts
- Data Representation
- Data Encoding
- Text-Based Protocols
- Request-Response Protocols
- Event Diagram
- Sequence Diagram
- Connection-Oriented Vs Connectionless IPC

**Client Server:**

- Architecture – Types of Servers – Connection Oriented-Connectionless,
- Iterative- Concurrent and Stateful Servers.
- Distributed Computing: Paradigm – Architecture – Application

**Socket API and Group Communication:**

- Background-The Socket Metaphor in IPC
- The Datagram Socket API
- The Stream-Mode- Socket API
- Sockets With Non-blocking I/O Operations
- Secure Socket API
- Group Communication – Unicasting- Multicasting and its types – Java Basic Multicast API - Reliable Multicast API

**Distributed Objects:**

- Message Passing Vs Distributed Objects
- An Archetypal Distributed Object Architecture
- Distributed Object Systems
- Remote Procedure Calls
- Remote Method Invocation: RMI Architecture
- API for Java RMI
- Sample RMI Application
- Building an RMI Application
- Testing and Debugging
- Comparison of RMI And Socket APIs

**CORBA, COM and Web Services:**

- CORBA Object Interface
- Inter-ORB Protocols
- Object Servers
- Object Clients
- CORBA Object References
- CORBA Naming Service
- Interoperable Naming Service
- CORBA Object Services
- Object Adapters
- Java IDL
- Web Services
- SOAP- UDDI- WSDL- XML
- RESTFUL WEB SERVICE

**REFERENCES:**


**Outcome:**

- Ability to learn distributed computing technology.
Objective:
To learn the concepts of Object Oriented Analysis and Design; exposing the development of OOAD based applications.


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 Database


REFERENCES:

Outcome:
To enable students to develop simple and complex applications involving OOAD principles
CA706 DISTRIBUTED TECHNOLOGY LAB

- Simple Client and Echo Server Example.
- Graphical Client and Multithreaded Echo Server.
- Synchronization with shared data and threads
- Broadcasting and Multicasting
- Sending and Receiving Objects (Object Serialization)
- Database Communications
- Java RMI
- Any Middleware Application

CA708 INFORMATION SECURITY LAB

Exercises to learn information security related programming.
## Objective:
To learn the concepts web technologies; develop and deploy effective web applications;


Client side programming – Java script language – java script objects – host objects

Browsers and the DOM


## REFERENCES:

## Outcome:
Ability to design and develop enterprise applications
Objective:
To learn the various concept of Distributed and Cloud computing and to study the Architecture and service models in Cloud computing.


Cloud Programming and Software Environments – Features of Cloud and Grid Platforms – Parallel and Distributed Paradigms – Programming Support of Google App Engine – Amazon AWS and Microsoft Azure - Emerging Cloud Software Environments

REFERENCES:

Outcome:
Acquiring Knowledge on the features and development of Cloud Computing and understanding several performance criteria to evaluate the quality of the cloud architecture

Industrial components:
Expert Lecture on current advancement in cloud and cloud support models.

**CA709  WEB TECHNOLOGY LAB**

**Pre-requisite:** CA 731

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

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**CA749  MINI PROJECT WORK**

Case Study/ Mini Project using the concepts and techniques covered in the syllabus
CA750  PROJECT WORK

6 Months internal/external project work with submission of project work and viva-voce examination
Objective:
To know the BI as expert information, knowledge and technologies efficient in the management of organizational and individual business.

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:

Outcome:
Students will decide Business Intelligence often uses Key Performance Indicators (KPIs) to assess the present state of business and to prescribe a course of action.
Objective:
To learn the UNIX operating system concepts and shell programming

Basic Editors: Concepts – Modes – Editor Commands

Implementation – Operations Unique to directories and regular files – Security and File
Permission

Introduction to Shells: UNIX Session – Standard Streams – Redirection – Pipes – Command
Line Editing – Job Control – Aliases – Variables – Shell/Environment Customization

Filters: Concatenating – Sorting – Translating Characters – Duplicate Lines – Character Count
File Transfer

C Shell Programming: Basic Scripts – Expressions – Decision Making Selections – Special
Parameters – Argument Validation – Debugging Scripts – Signals – Scripting Techniques

REFERENCES:


Outcome:
Ability to understand the UNIX operating system concepts and familiarity with
shell programming
CA7A3 VISUAL PROGRAMMING

**Objective:**
Understand the principles of graphical user interface design and develop desktop applications and web services using .NET


**REFERENCES:**

**Outcome:**
Ability to understand and develop applications using Visual studio environment

**Industrial Component:**
A series of lectures on the latest trends and technology
Objective:
To know the issues related to the design of complex software and to learn the project management concepts and the use of tools.

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


REFERENCES:

Outcome:
Ability to apply software project management principles for successful software project development

Industrial Component
Presentation of Case studies on the design & development of complex software and current practices of successful project management activities by practicing professionals from leading industries
CA7A5 BUSINESS ETHICS

Objective:
To introduce business ethics and its practices.


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 Objective and goals, Ownership pattern – Issues in managing public limited firms – Agency problems

REFERENCES:

Outcome:
Ability to understand the business ethics and its practices.
Objective: 
To introduce green computing in the ICT environments.

Importance of Green IT: The Growing Significance of Green IT and Green Data Centers - All Basic Steps towards Green IT - The Basics of Green IT

Collaboration is Key for Green IT - The Government’s Role - Regulation and EPA Activity - Regulating Greenhouse Gases - Role of the EPA - IT Company Support of Government Regulation - Educational Institutions and Government Regulation

Magic of Incentive - The Role of Electric Utilities - A Most-Significant Step - “Virtualizing” IT Systems: Consolidation and Virtualization - Data Storage


REFERENCES:

Outcome:
Ability to understand Green Computing principles.
CA7B2 IMAGE PROCESSING

Objective:
To understand the fundamental algorithms in image processing and to gain experience in applying image processing algorithms to real time problems.


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


REFERENCES:

Outcome:
Ability to understand fundamental algorithms in Image Processing and apply for real time problems
CA7B3 SOFTWARE AGENTS

Objective:
To learn the concepts (basic to advanced levels) of agent technologies and their applications in developing complex software systems

Agent and user experience: Interacting with Agents - Agent from Direct Manipulation to Delegation - Interface Agent Metaphor with Character - Designing Agents - Direct Manipulation versus Agent Path to Predictable


Agent communication and collaboration: Overview of Agent Oriented Programming - Agent Communication Language - Agent Based Framework of Interoperability

Agent Architecture: Agents for Information Gathering - Open Agent Architecture - Communicative Action for Artificial Agent

Mobile agents and advanced concepts: Mobile Agent Paradigm - Mobile Agent Concepts - Mobile Agent Technology - Case Study: Tele Script, Agent Tel – Emerging Agent Technologies.

REFERENCES:

Outcome:
To enable students to incorporate autonomy, self-learning, proactive and related characteristics in software applications; Understanding the impact of agent principles in internet/web applications.
CA7B4 MARKETING MANAGEMENT

**Objective:**

To facilitate understanding of the conceptual framework of marketing and its applications in decision making under various environmental constraints.

Introduction to marketing, scope of marketing, core marketing concepts, new marketing realities, production concept, product concept, selling concept, marketing concept, Relationship Marketing, Integrated Marketing, Performance Marketing, new 4P’s


Product: Levels, hierarchy, Classification of products, Major product decisions, Product line and product mix; Branding, brand equity, Product life cycle – strategic implications, New product development and consumer adoption process. Pricing: Objective of pricing decision, factors affecting price determination, pricing policies, developing pricing strategies, strategies for new products and existing products

Promotion: Communication Process; Promotion mix – advertising, personal selling, sales promotion, publicity and public relations, direct marketing; Determining advertising budget; Copy designing and testing; Media selection; Advertising effectiveness; Sales promotion – tools and techniques

Market control: Annual plan control, sales analysis market share analysis, profitability control, marketing profitability analysis, efficiency control and strategic control. Trends in marketing, socially responsible marketing, internal marketing, green marketing, cause marketing, cause related marketing

REFERENCES:


**Outcome:**

Ability to analyze marketing decisions in business environment.
CA7B5 SOFT COMPUTING

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


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

Fuzzy Sets, Operations on Fuzzy sets, Fuzzy Relations, Fuzzy Measures, Applications of Fuzzy Set Theory to different branches of Science and Engineering

NeuroFuzzy and Soft Computing, Adaptive Neuro-Fuzzy Inference System Architecture, Hybrid Learning Algorithm, Learning Methods that Cross-fertilize ANFIS and RBFN


**REFERENCES:**

**Outcome:**
- To understand Neural, Fuzzy and genetic Algorithms
- To understand PSO and Neuro Fuzzy computing

**Industrial Component:**
A series of tutorials on MATLAB.
CA7B6 ADVANCED DATABASE TECHNOLOGY

**Objective:**
To learn advanced database models and design of databases


Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases – Mobile Databases – Location and Handoff Management – Mobile Transaction Models

**REFERENCES:**

**Outcome:**
Gain knowledge and understanding of modern and advanced database technology.
Objective:
• To understand the techniques of random number generations and testing randomness.
• To design simulation models for various case studies like inventory, traffic flow networks, etc.
• To practice on simulation tools and impart knowledge on building simulation systems.

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


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


REFERENCES:

Outcome:
• Understand the techniques of random number generations and testing randomness.
• Design simulation models for various case studies like inventory, traffic flow networks, etc.
CA7B8 BUSINESS PROCESSES MODELLING

Objective:
- Identify and model core business processes at an organisational level
- Identify and model business processes at the process level

Procedure for business process modelling - Identification, Modelling, Analysis, Improvement, Implementation and Control; Approaches to business process modeling; hierarchy of business processes – organisation, process and task levels; differences between the process view and the functional view of an organization; advantages of the process view

Organisational model of processes - strategic context for business processes; Relationships between processes, including those at the same level and between levels of hierarchy; Building an organizational view of processes; Delivering value to customers and the value proposition

Modelling the business processes - Selected business process modelling technique(e.g., ontology) - Notation – actors, tasks, process flows, decisions and Rules; Modelling as-is business processes; Events that trigger business processes; External business events and Internal business events; Time-based business events The outcomes from business processes; Timelines for business processes; Business process measures

Evaluating and improving business processes - Identifying problems with the as-is business processes Analysing the process flow; Analysing the tasks; Staff performance issues; Challenging the business rules; Modelling the to-be business processes; Approaches to business process improvement

Transition - Integration of business process modeling and requirements definition; Implementation issues - Approaches – pilot run, direct changeover, parallel; Organisational design; Role definition; Staff development; Managing change implementation

REFERENCES:

Outcome:
An ability to classify and analyze different types of businesses and to identify and solve issues related to Business Processes
Objective:
To learn the concepts (basic to advanced levels) of user oriented aspects of product designs (physical to software); providing in depth study on Human Centric and Human oriented features in developing systems.

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, 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. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors


HCI and related fields – Cognition Theory – A.I. – Accessibility Issues – Assistive Technologies – Technologies for HCI – Research Directions in HCI

REFERENCES:
7. SorenLauesen, ”User Interface Design”, Pearson Education

Outcome:
To enable students to understand HCI principles and practice them in product designs.

Industrial Component:
Providing exposure to HCI based software development products.
CA7C2 BIOINFORMATICS

Objective:
To 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.


REFERENCES:

Outcome:
Ability to solve bioinformatics problems by analyzing and using new design strategies to minimize the complexities in the biological systems.
CA7C3 MOBILE AND PERVERSIVE COMPUTING

**Objective:**
To introduce the necessary concept of mobile communication system and pervasive computing.


Pervasive Computing: Past, Present and Future Pervasive Computing - Pervasive Computing Market – m-Business – Application examples: Retail, Airline check-in and booking – Sales force automation – Health care – Tracking – Car information system – E-mail access via WAP


**REFERENCES:**

**Outcome:**
Ability to understand the architecture of mobile communication, principles, technologies and applications.
CA7C4  MULTICORE ARCHITECTURE

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


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

REFERENCES:

Outcome:
Ability to program and test on various multi-core systems.
## Objective:
To learn the concepts mobile technologies; develop and deploy effective mobile applications.

The Mobile Ecosystem: Operators - Networks - Devices - Platforms - Operating Systems - Application Frameworks - Applications - Services


## REFERENCES:
1. Mobile Design and Development by Brian Fling, O’Reilly Media, Inc 2009

## Outcome:
Ability to design and develop mobile applications
CA7C6 BIG DATA MANAGEMENT

**Objective:**
To gain ability to design high scalable systems.

Big Data – Unstructured Data - Introduction to data analytics, big data analytics, big data management

Data Management Techniques: Storage of large data – Analyze of large data –Extraction of business relevant, social relevant information

Columnar databases - Map Reduce as a tool for creating parallel algorithms -Processing very large amounts of data.

Big Data applications -Columnar stores -Distributed databases –Hadoop -Locality Sensitive Hashing (LSH) –Dimensionalityreduction –Datastreams –Unstructured data processing, NoSQL-NewSQL

Mining massive datasets - Socio-Business intelligence using big-data

**REFERENCES:**
1. Michael Minelli, Michele Chambers, AmbigaDhiraj ,”Big Data, Big Analytics”, John Willey , 2013

**Outcome:**
Ability to scalable systems to accept, process, store and analyze use large volumes of unstructured data.
CA7C7 EVOLUTIONARY COMPUTING

**Objective:**
To provide evolutionary Computation and global optimization techniques.

Evolutionary computing: Biological foundation of Evolutionary computing, Introduces evolutionary algorithms, a class of stochastic, population-based algorithms inspired by natural evolution theory, capable of solving complex problems for which other techniques fail.


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. Applications of ACO

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

Mimetic algorithm, Firefly Algorithm, multi objective algorithms

**REFERENCES:**


**Outcome:**
Ability to analyze and solve problems in optimization and complex domains.
CA7C8 SOCIAL NETWORK ANALYSIS

**Objective:**
To introduce the concepts and methods of social network analysis.

Social network concepts – Development of social network and analysis - Online social networks – Social Network Data - Issues and challenges

Linked-based and structural analysis - Content-based analysis - Static and dynamic analysis

Mathematical Representation of social networks

Social networking systems and API - Statistical Analysis of Social Networks- Community Detection in Social Networks - Node Classification in Social Networks -Evolution in Dynamic Social Networks

Social Influence Analysis -Link Prediction in Social Networks -Data Mining in Social Media

Text Mining in Social Networks - Social Tagging -Building social services

Tools for Social network analysis: UCINET – PAJEK – NETDRAW – StOCNET - SPlus - R – NodeXL- SIENA and RSIENA - Real-world networks (Facebook graph, Twitter networks, etc.)

**REFERENCES:**
2. David Easley and Jon Kleinberg, “Networks, Crowds, and Markets: Reasoning About a Highly Connected World”, 2010

**Outcome:**
Ability to analyze and solve problems in optimization and complex domains