MASTER OF COMPUTER APPLICATIONS

SYLLABUS
FOR
CREDIT-BASED CURRICULUM
(Applicable for 2013-2014 onwards)

Board of Studies

7th May, 2013

DEPARTMENT OF COMPUTER APPLICATIONS
NATIONAL INSTITUTE OF TECHNOLOGY
TIRUCHIRAPPALLI – 620 015
TAMIL NADU INDIA

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:

- o To offer state-of-art education in Information Science and Technology
- o To provide strong theoretical foundation complemented with extensive practical training
- o 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
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  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

Semester	Subject Code	Subject Name	L	T	P	C
I	CA711	Problem Solving and Programming	3	0	0	3
	CA713	Mathematical Foundations of Computer Applications	3	0	0	3
	CA715	Computer Organization and Architecture	3	0	0	3
	CA717	Accounting and Financial Management	3	0	0	3
	CA719	Probability and Statistical Methods	2	1	0	3
	CA701	Programming in C Lab	0	0	4	2
	CA703	Business Communication	0	0	4	2
II	CA710	Data Structures and Applications	2	1	0	3
	CA712	Database Management Systems	3	0	0	3
	CA714	Operating Systems	3	0	0	3
	CA716	Object-oriented Programming	2	1	0	3
	CA718	Resource Management Techniques	3	0	0	3
	CA702	DBMS Lab	0	0	4	2
	CA704	Data Structures Lab	0	0	4	2
III	CA721	Data Mining Techniques	2	1	0	3
	CA723	Graphics and Multimedia	3	0	0	3
	CA725	Software Engineering	2	1	0	3
	CA727	Computer Networks	3	0	0	3
	CA729	Design and Analysis of Algorithms	2	1	0	3
	CA705	OS and Networks Lab	0	0	4	2
	CA707	Graphics and Multimedia Lab	0	0	4	2
IV	CA722	Organizational Behaviour	3	0	0	3
	CA724	Information Security	3	0	0	3
	CA726	Distributed Technology	3	0	0	3
	CA728	Object- Oriented Analysis and Design	3	0	0	3
	XXXX	Elective I (from List A)	3	0	0	3
	CA706	Distributed Technology Lab	0	0	4	2
	CA708	Information Security Lab	0	0	4	2
V	CA731	Web Technology	3	0	0	3
	CA733	Cloud Computing	3	0	0	3
	XXXX	Elective-II	From List B& C	3	0	0	3
	XXXX	Elective-III		3	0	0	3
	XXXX	Elective-IV		3	0	0	3
	CA709	Web Technology lab	0	0	4	2
	CA749	Mini Project Work	0	0	4	2
VI	CA750	Project Work	-	-	-	10
		Grand Total	**70**	**5**	**40**	**105**

L: LECTURE | T: TUTORIAL | P: PRACTICAL | C: CREDITS

LIST OF ELECTIVES

List	Subject Code	Subject Name	L	T	P	C
A	CA7A1	Business Intelligence	3	0	0	3
	CA7A2	Unix and Shell Programming	3	0	0	3
	CA7A3	Visual Programming	3	0	0	3
	CA7A4	Software Architecture and Project Management	3	0	0	3
	CA7A5	Business Ethics	3	0	0	3
B	CA7B1	Green Computing	3	0	0	3
	CA7B2	Image Processing	3	0	0	3
	CA7B3	Software Agents	3	0	0	3
	CA7B4	Marketing Management	3	0	0	3
	CA7B5	Soft Computing	3	0	0	3
	CA7B6	Advanced Database Technology	3	0	0	3
	CA7B7	Modeling and Computer Simulation	3	0	0	3
	CA7B8	Business Processes	3	0	0	3
C	CA7C1	Human Computer Interaction	3	0	0	3
	CA7C2	Bioinformatics	3	0	0	3
	CA7C3	Mobile and Pervasive Computing	3	0	0	3
	CA7C4	Multi-core Programming	3	0	0	3
	CA7C5	Mobile Application Development	3	0	0	3
	CA7C6	Big Data Management	3	0	0	3
	CA7C7	Evolutionary Computing	3	0	0	3
	CA7C8	Social Network Analysis	3	0	0	3

L: LECTURE | T: TUTORIAL | P: PRACTICAL | C: CREDITS

CA711 PROBLEM SOLVING AND PROGRAMMING

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

Introduction to Computers: Block diagram – Hardware and Software components, Programming paradigms, Program Development Cycle, Evolution of Programming languages. Principles of Structured programming – Sequential, selective and repetitive structures –Modular Programming – Functions and Procedures– Parameter passing methods

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

Structures – Variables, Accessing members, Assignment and nesting – Pointers to Structures – Structures and functions – Array of Structures – Structures with pointers – Unions – Bitwise operations – Files : operations – Formatted input/output – character input/output – File positioning and Error handling - Pre-processor directives- Command line arguments

REFERENCES:

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

Outcome:
Ability to analyze and solve problems systematically and write programs in C.

CA713MATHEMATICAL FOUNDATIONS OF COMPUTER APPLICATIONS

Objective:
To learn the mathematical foundations applicable to computing.

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", Elsevier,2006.
2. NarsinghDeo, "Graph theory and applications to Engineering and Computer Science", PHI,1986.
3. Arthur Gill, "Applied Algebra for the Computer Sciences", Prentice Hall,1976.
4. Michael Sipser, "Introduction to Theory of Computation", PWS Publishing Co,1996.

Outcome:
Ability to apply relevant mathematical ideas and techniques for solving problems.

CA715COMPUTER ORGANIZATION AND ARCHITECTURE

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.

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 – Multi-core – Mobile – Embedded - Cloud computing.

REFERENCES:
1. William Stallings, "Computer Organization and Architecture", 9th Edition, PHI,2012
2. M. Morris Mano, Michael D. Ciletti, "Digital Design", 4th Edition, Pearson Education, 2011.
3. Hennessy J. and Patterson D., "Computer Architecture :A Quantitative Approach", 5th Edition, Morgan Kaufmann, 2011.

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:

1. S.N. Maheswari and S.K. Maheswari, "An Introduction to Accountancy", 8th Edition, Vikas Publishing, 2003.
2. Manmohan and Goyal, "Principles of Management and Accounting", 5th Edition, SahityaBhawan, 1994.

Outcome:
Ability to understand the functional areas of accounting and financial management.

CA719 PROBABILITY AND STATISTICAL METHODS

Objective:
To learn the fundamentals of numerical and statistical methods.

Sources and types of errors – Chopping and Rounding in different number systems – Stability of numerical algorithms – Transcendental and polynomial equation – iterative method – Regula-Falsi Method – Newton-Raphson method – Roots of polynomials –Graeffe's and Bairstow methods

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

Probability Spaces- Elementary Theorem – Conditional Probability – Independent events – Random variables – Probabilistic modeling

Bionomial, 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:
1. Gerald, C.F, and Wheatley, P.O, "Applied Numerical Analysis", 7th Edition, Pearson Education Asia, 2004.
2. Burden, R.L and Faires, T.D., "Numerical Analysis", Seventh Edition, Thomson Asia Pvt. Ltd., 2002.
3. John.E..Freund, Irwin Miller, Marylees Miller "Mathematical Statistics with Applications ", 8th, Prentice Hall of India, 2012.
4. SankaraRao K., "Numerical Methods for Scientists and Engineers", 3rd Ed. Prentice Hall India.2007.
5. Manish Goyal, "Numerical Methods and Statistical Techniques Using 'C'", University Science Press, 2010
6. Yannis viniotis, " Probability and Random Processes for electrical engineers", McGraw-Hill International Edition, 1998

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

CA703 BUSINESS COMMUNICATION

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.

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:

1. Simon Sweeney, "English for Communication", 2nd Edition, CUP, 2003
2. Leo Jones and Richard Alexander, "New International Business English", CUP, 2000.

Outcome:
Ability to communicate in the business world using different communication tools

CA710 DATA STRUCTURES AND APPLICATIONS

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

Advanced data structures –Data structures for disjoint sets- Red-black trees – insertion and deletion – B-trees – Definition, insertion, deletion – Splay tree, Binomial heaps – operations – Geometric data structures: segment trees, range trees, partition 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:
1. S. Lipschutz and G.A.V. Pai, "Data Structures", Tata McGraw-Hill,2010.
2. M.A.Weiss, "Data Structures and Problem Solving using Java", 4th Edition, Addison Wesley,2009.
3. P. Brass, "Advanced Data Structures", Cambridge University Press,2008.
4. M.J.Augestein, Y.Langsam and A.M. Tenenbaum, "Data Structures using Java", Pearson Education, 2004.
5. R. Kruse and C.L. Tondo, "Data Structures and Program Design in C", 2nd Edition, Prentice Hall,1996.
6. T.A.Standish, "Data structures, Algorithms and Software principles in C", Addison Wesley, 1994.

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.

File System versus DBMS – Advantages – Database Languages – ER-Model: Entities – Relationships – Additional Features of ER Model – Conceptual Design with ER Model

Relational Model – Keys - Constraints – Querying – Views - Relational Algebra – Relational Calculus – SQL – QBE

File Organization – Organization of records in files – Indexing – Ordered Indices - B $^+$ Tree Index files – Hashing – Static – Dynamic – Query Optimization – Transformation of Relational Expressions – Choice of evaluation plans

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

DB Tuning – Security – Transaction Management – Transactions – Transaction state – Concurrent executions – Serializability – Concurrency Control – Protocols – Crash Recovery

REFERENCES:

1. Raghu Ramakrishnan and Johannes Gehrke, "Data Base Management Systems", 3rd Edition, McGraw-Hill, 2003.
2. Silberschatz, Korth and Sudarshan, "Data Base System Concepts", McGraw-Hill, 6th Edition, 2010.
3. C. J. Date, "An Introduction to Database Systems", 8th Edition, Addison-Wesley, 2003.
4. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", 5thEdition, Pearson Education/Addison Wesley, 2007.

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.

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-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 andsecurity -Case Study-Linux, Windows, Mac OS and Mobile OS

REFERENCES:
1. Silberschatz, Galvin and Gagne, "Operating System Concepts", 9th Edition, John Wiley & Sons Inc, 2013.
2. Andrew S. Tanenbaum, "Modern Operating Systems", 3rd Edition, Prentice-Hall of India, 2007
3. SibsankarHaldar, Alex A.Aravind, "Operating systems", Pearson Education,2009.

Outcome:

Understand the support rendered by operating system in every phase of computer based problem solving.

CA716   OBJECT ORIENTED PROGRAMMING

Objective:
To learn the basic principles of object-oriented programming paradigm using C++

Programming Paradigms - Introduction to OOP – Overview of C++ - Classes – Structures – Union – Friend Functions – Friend Classes – Inline functions – Constructors – Destructors – Dynamic Initialization of Objects - Static Members – 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 – 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

Streams – Formatted I/O with IOS class functions and manipulators –File I/O – Name spaces –Array based I/O – 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 Objects - Function Objects

REFERENCES:
1. Stephen Prata,"C++ Primer Plus", 6th Edition ,Addison-Wesley Professional, 2011
2. BjarneStroustrup, "Programming: Principles and Practice Using C++,1st Edition, Addison-Wesley Professional, 2008
3. Andrew Koenig and Barbara E. Moo, "Accelerated C++: Practical Programming by Example", 1st Edition, Addison-Wesley Professional, 2000
4. Bruce Eckel ,"Thinking in C++: Introduction to Standard C++: Volume One" 2nd Edition,PrenticeHall, 2000
5. Andrei Alexandrescu , "Modern C++ Design: Generic Programming and Design PatternsApplied" , 1st Edition, Addison-Wesley Professional, 2001

Outcome:
Ability to apply appropriate object-oriented programming concepts for solving real world problems

CA718 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.

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

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

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 mining – Motivation – Importance - DM Vs KDD - DM Architecture - Data Types – DM Tasks –DM System Classification - Primitives of DM - Data Mining Query Language - DM Metrics - DM Applications - DM Issues – Social Implications of DM

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:
1. JiaweiHan ,MichelineKamber, "Data Mining: Concepts and Techniques", 2nd Edition, Elsevier India Private Limited,2008.
2. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2012.
3. K.P.Soman, ShyamDiwakar, V.Ajay, "Insight into Data Mining Theory & Practice, Prentice Hall India,2012,
4. G.H.Gupta, "Introduction to Data Mining with Case Studies", 2nd Edition, PHI.

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

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

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

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

REFERENCES:
1. Hearn D and Baker M.P, "Computer graphics–C Version", 2nd Edition, Pearson Education, 2004.
2. Donald Hearn, M. Pauline Baker, "Computer Graphics", 2nd Edition, 2000, PHI.
3. Ralf Steinmetz, Klara Steinmetz, "Multimedia Computing, Communications and Applications", Pearson Education,2004.
4. Siamon J. Gibbs ,Dionysios C. Tsichritzis, "Multimedia programming", Addison Wesley,1995.
5. John Villamil, Casanova ,LeonyFernanadez, Eliar, "Multimedia Graphics", PHI,1998.
6. Ralf Steinmetz, KlaraNahrstedt "Multimedia: Computingcommunications& Applications", Pearson Education, 2001.
7. Ralf Steinmetz, KlaraNahrstedt "Multimedia Computing and Communications and Applications" 11th Impression, Pearson Education, 2012.

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.

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

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

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

Formal Methods Clean-room Software Engineering – Software reuse – Reengineering – Reverse Engineering – standards for industry

REFERENCES:
1. Rajib Mall, "Fundamentals of Software Engineering", 3rd Edition, PHI, 2009.
2. Roger S. Pressman, "Software Engineering-A practitioner's approach", 6thEdition, McGraw Hill, 2001.
3. Ian Sommerville, Software engineering, 8thEdition,Pearson education Asia, 2007.
4. PankajJalote, "An Integrated Approach to Software Engineering", Springer Verlag,1997.
5. James F Peters,WitoldPedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, 2000.
6. Ali Behforooz, Frederick J Hudson, "Software Engineering Fundamentals", Oxford University Press, 2009.

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.

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

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:
1. BehrouzA.Forouzan, "Data Communications and Networking", 4th Edition, McGraw-Hill, 2004.
2. William Stallings, "Data and Computer Communications", 9thEdition, Pearson, 2011.
3. Larry L. Peterson and Bruce S. Davie, "Computer Networks - A systems Approach", 5thEdition, Harcourt Asia/Morgan Kaufmann, 2011.
4. James F. Kurose and Keith W. Ross, "Computer Networking - A Top Down Approach", 5th Edition, Addison Wesley, 2009.
5. Andrew S. Tanenbaum, "Computer Networks",5th Edition, Prentice Hall PTR,2012

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.

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 – 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. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", 3rd Edition, MIT Press,2009.
2. Robert Sedgewick and Philippe Flajolet, "An Introduction to the Analysis of Algorithms", 2nd Edition, Addison-Wesley,2013
3. Jon Kleinberg and ÉvaTardos, "Algorithm Design", Addison-Wesley,2005.
4. George T. Heineman, Gary Pollice and Stanley Selkow, "Algorithms in a Nutshell", O'Reilly Media, 2008.
5. SanjoyDasgupta, Christos Papadimitriou and UmeshVazirani,"Algorithms", McGraw-Hill,2006.
6. E.Horowitz, S.Sahni, and S.Rajasekaran, "Computer Algorithms", 2nd edition, Silicon Press,2007.

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

<table>
<tr><td>Objective:
To learn the leadership skills and group behavior.</td></tr>
</table>

History of Management - The human relations movement - The Hawthorne studies - Models for organizational behavior – Management concepts.

Foundations of Individual Behavior - Personality – Meaning and development - Major determinants of Personalityand Values -Theories of Personality – Perception and Individual Decision Making – sensation versus perception - Stress – Causes and effect of job stress - coping strategies for stress.

Foundations of Group Behavior - Understanding Work Teams - Communication - Basic Approaches to Leadership - Contemporary Issues in Leadership – MotivationConcepts - Motivation From Concepts to Applications –Work motivation – Attitude and Job Satisfaction - Power and Politics - Job design - Goal setting

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

Foundations of Organization Structure - Organizational Culture – Organizational Dynamics

REFERENCES:
1. Stephen P. Robbins , Timothy A. Judge, "Organizational Behavior", 14th Edition, Pearson Education,2012.
2. Robert Kreitner, Angelo Kinicki, "Organizational Behavior", 8th Edition, McGraw-Hill,2007.
3. Fred Luthans, "Organizational Behavior", McGraw Hill, 1997.
4. Keith Davis, "Human behavior at work: Human relations and Organizational Behavior", Tata McGraw Hill, 1982.
5. Rudrabasavaraj M.N. "Dynamic personnel Administration", 3[rd]Edition,Himalaya Publishing House, 2011.

<table>
<tr><td>Outcome:
Ability to practice ethical behavior and community responsibilities in organizations and society.</td></tr>
</table>

Industrial Component:
A series of tutorials on Organisation development

CA724 INFORMATION SECURITY

Objective:
To study the concepts and requirements of Information Security.

Information Security - Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, SDLC, Security SDLC

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

Network Security: Network Protocols, Wireless Security (WiFi, WiMAX,Bluetooth, cell phone), IDSand Network Intrusion Management

Application Security: Email Security, Web Security, and Database Security, Secure Software Development, VoIP Security

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

REFERENCES:
1. W. Stallings, Cryptography and Network Security: Principles and Practice, 6th Edition, Prentice Hall, 2013
2. Neil Daswani, Christoph Kern, Anita Kesavan, " Foundations of Security: What Every Programme", APRESS, 2007.
3. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House,2003.

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-Timeoutsand 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:
1. M. L. Liu, "Distributed Computing Principles and Applications", Pearson Education 2004
2. Mark Hansen, "SOA using JAVA Web Services", Prentice Hall 2007
3. Crichlow, "Distributed Systems: Computing over Networks", PHI 2009
4. Tanenbaum, Sten, "Distributed Systems - Principles and Paradigms", PHI 2006
5. Puder, "Distributed Systems Architecture - A Middleware Approach", Science & TechnologyBooks 2005.
6. Lynch, "Distributed Algorithms" Science & Technology Books 1996.
7. David Reilly & Michael Reilly, "Java Networking and Distributed Computing", Addison Wesley,2002.
8. Jim Farley, "Java Distributed Computing", O'Reilly Media; 1st edition, 1998.

Outcome:
   Ability to learn distributed computing technology.

CA728 OBJECT ORIENTED ANALYSIS AND DESIGN

Objective:

To learn the concepts of Object Oriented Analysis and Design; exposing the development of OOAD based applications.

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 – Rambaugh's Method – Booch Method – Jacobson et al Method – Comparisons – UML – Static-Dynamic Models – Diagrams –Use Cases.

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

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

REFERENCES:

1. Grady Booch et al, "Object-Oriented Analysis and Design with Applications", 3rd Edition, Pearson Education, 2007.
2. Michael Blaha and James Rumbaugh, "Object-Oriented Modeling and Design with UML", 2nd Edition, Pearson Education,2005
3. PatricNaughton , Herbert Schildt, "Java 2 Complete Reference", Tata McGraw Hill, 1999.
4. Joshua Bloch, "Effective Java", Addison-Wesley; 2nd Edition, 2008
5. Bruce Eckel, "Thinking in Java", Prentice Hall; 4th Edition, 2006
6. Erich Gamma, Richard Helm, Ralph Johnson & John Vlissides, "Design Patterns: Elements of Reusable Object-oriented Software", Pearson Education India, 2004.

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.

CA731 WEB TECHNOLOGY

Objective:
To learn the concepts web technologies; develop and deploy effective web applications;

Web essentials – W3C - clients – servers - communication – markup languages – XHTML – simple XHTML pages style sheets – CSS

Client side programming – Java script language – java script objects – host objects Browsers and the DOM

Server side programming – Java servlets – basics – simple program – separating programming and presentation – ASP/JSP - JSP basics ASP/JSP objects – simple ASP/JSP pages.

Representing Web data – data base connectivity – JDBC – Dynamic Web pages – XML – DTD – XML schema – DOM – SAX – XQuery - Building Web applications - cookies – sessions – open source environment – PHP – MYSQL –case studies.

Middleware Technologies – Ecommerce – Architectures – Technologies – Ajax – Advanced Web Technologies and Tools.

REFERENCES:
1. Jeffrey C Jackson, "Web Technology – A computer Science perspective", Persoson Education, 2007.
2. Chris Bates, "Web Programming – Building Internet Applications, "Wiley India, 2006.

Outcome:
Ability to design and develop enterprise applications

CA733   CLOUD COMPUTING

Objective:
To learn the various concept of Distributed and Cloud computing and to study the Architecture and service models in Cloud computing.

Distributed Systems Models and Enabling Technologies: Scalable Computing – Technologies for Network-Based Systems – System Models for Distributed and Cloud Computing – Software Environments for Distributed and Clouds – Performance, Security and Energy Efficiency

Virtualization concepts: Implementation Levels of Virtualization – Virtualization Structures - Tools and Mechanisms – Virtualization of CPU, Memory and I/O Devices – Virtual Clusters and Resource Management – Virtualization for Data-Center Automation, Introduction to Various Virtualization OS - Vmware , KVM, Xen.

 Service-Oriented Architecture for Distributed Computing: Services and SOA – Message-Oriented Middleware – Portals and Science Gateways – Discovery-Registries-Metadata - Workflow in SOA

Cloud Computing and Service Models – Data-center Design and Interconnection Networks – Architectural Design of Compute and Storage Clouds – Public cloud Platforms – Inter-cloud Resource Management – Cloud Security and Trust Management

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:
1. Kai Hwang, Geoffrey C.Fox, and Jack J. Dongarra, "Distributed and Cloud Computing", Elsevier India Private Limited, 2012.
2. Foster and Kesselman, "The Grid : Blueprint for a New Computing Infrastructure", Morgan Kauffman publishers Inc.2004
3. Coulouris, Dollimore and Kindber, "Distributed System: Concept and Design", Fifth Edition, Addison Wesley, 2011.
4. Michael Miller, "Cloud Computing", Dorling Kindersley India,2009.
5. Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, "Cloud computing: A practical Approach", McGraw Hill,2010.

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

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

ELECTIVES -A

CA7A1 BUSINESS INTELLIGENCE

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:
1. E Turban, J E Aronson, Teng Pend Liang and Ramesh Sharda, "Decision Support and Business Intelligence Systems", 8th Edition, Pearson Education, 2009.
2. Dan Volitich, "IBM Cognos Business Intelligence", TMH,2008
3. Chuck Ballard, Dirk Herreman, Don Schau, Rhonda Bell,Eunsaeng Kim, Ann Valencic, "Data Modeling Techniques for Data Warehousing", IBM Corporation, 1999

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.

CA7A2 UNIX AND SHELL PROGRAMMING

Objective:
To learn the UNIX operating system concepts and shell programming

Introduction – UNIX Environment –Structure – Accessing UNIX –Common Commands – Basic Editors: Concepts –Modes –Editor Commands

File Systems: File names –File Types –Regular Files –Directories –File System 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 –Comparing Files. Communications: User commands –Electronic mail –Remote Access – File Transfer

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

REFERENCES:

1. Behrouz A. Forouzan, Richard F. Gilberg, "UNIX and Shell Programming ", 9th Edition, Cengage Learning, 2009.
2. SumitabhaDas,"UNIX Concepts and Applications",8th Edition, Tata McGraw Hill, 2008
3. M G Venkateshmurthy: UNIX and Shell Programming, Pearson Education, 2005
4. Maurice J. Bach, "The Design of the Unix Operating System", Indian Edition, PHI Learning Private Limited, 2011.

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

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

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

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

.NET – Form- Event–Form Controls – Containers – Menus - Data controls - Printing – Reporting – Dialogs – Components - Single and Multiple Document Interfaces.

ASP.NET – Web Pages, Web Forms, Web Site Design, DataControls, ValidationControls, HTML, NavigationControls, LoginControls, Reports - Master Pages – Web Service Architecture - Basic Web Services – Web Reference – Standards.

RERERENCES:

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

Outcome:

Ability to understand and develop applications using Visual studio environment

Industrial Component:

A series of lectures on the latest trends and technology

CA7A4 SOFTWARE ARCHITECTURE AND PROJECT MANAGEMENT

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

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 –Emerging Models - 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

RERERENCES:

1. Len Bass, Paul Clements, and Rick Kazman, "Software Architecture in Practice", 2nd Edition, Addison-Wesley Longman, Inc., Reading, MA, 2003
2. Richard N.Taylor, NenadMedvidovic, and Eric M.Dashofy, "Software Architecture: Foundations, Theory and Practice", Wiley India Edition, 2012
3. Mary Shaw, and David Garlan ," Software Architecture in Practice: Perspectives on an Emerging Discipline", PHI Learning Private Limited,2010
4. Ramesh and Gopalaswamy, "Managing Global Projects", Tata McGraw Hill,2001

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.

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 Objective 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", Wiley-Blackwell, 2008
3. E. Banks, "Corporate Governance: Financial Responsibility, Ethics and Controls", 2004, Palgrave Macmillan, 2004
4. Laura P. Hartman & Joe DesJardins, Business Ethics: Decision- Making for Personal Integrity and Social Responsibility, NY: McGraw- Hill/Irwin, 2008.

Outcome:
Ability to understand the business ethics and its practices.

ELECTIVES -B

CA7B1GREEN COMPUTING

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" ITSystems: Consolidation and Virtualization - Data Storage

Need for Standard IT Energy-Use Metrics: SPEC -EPA- LEED- Green Grid Data Center Power-Efficiency Metrics: PUE and DciE. Data Center - Strategies for Increasing Data Center - Cooling Efficiency - Fuel Cells for Data Center Electricity - Emerging Technologies for Data Centers.

Web, Temporal And Spatial Data Mining Green IT Case Studies for Energy Utilities - Green IT Case Studies for Universities and a Large Company - Worldwide Green IT - Case Studies - The Future of Green IT for Corporations.

REFERENCES:
1. John Lamb, "The Greening of IT-How Companies Can Make a Difference for the Environment", IBM Press 2009
2. Frederic P. Miller, Agnes F. Vandome, John McBrewster, "Green Computing", Alpha script publishing,

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.

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 – LoeveTransforms

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 – Thrsholding – Region-based segmentation – Boundary representation: chair 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, Pearson Education, India, 2008.
2. A.K. Jain, "Fundamentals of Digital Image Processing", PHI,2010
3. Kenneth R. Castleman, Digital Image Processing, 2nd Edition, Pearson, 2006.
4. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.
5. D,E. Dudgeon and RM. Mersereau, , Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.
6. William K. Pratt, , Digital Image Processing' , John Wiley, 3rd Edition ,New York, 2008

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

Agents for Learning in Intelligent Assistance:Agents for Information Sharing and Coordination - Agents that Reduce Work Information Overhead - Agents without Programming Language - Life like Computer character - S/W Agents for cooperative Learning - Architecture of Intelligent Agents

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:
1. Jeffrey M.Bradshaw," Software Agents ", MIT Press, 2000.
2. William R. Cockayne, Michael Zyda, "Mobile Agents", Prentice Hall, 1998
3. Russel&Norvig, " Artificial Intelligence: A Modern Approach ", Prentice Hall, 2nd Edition, 2002
4. Joseph P.Bigus& Jennifer Bigus, "Constructing Intelligent agents with Java: A Programmer's Guide to Smarter Applications ", Wiley, 1997.

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

Buying Behaviour: key psychological process, buying decision process, stages in buying process. Bases for Segmenting: Consumer, Business Markets, Market Targeting, Positioning

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:
1. Philip Kotler,"Marketing Management", 14[th]Edition, Pearson Prentice Hall,2011
2. Ramaswamy V.S and Namakumari .S," Marketing Management: Planning, implementation and control", 2[nd]Edition, Macmillan, New Delhi,1997
3. Michael J. Etzel, Bruce J. Walker, William J. Stanton, Ajay Pandit, "marketing – concepts and cases", special Indian edition, McGraw Hill
4. Zikmund d Amico, "The power of Marketing" , 7th edition, Sowth Western , Thomson Learning Publications, 2006.

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.

Soft Computing and its Techniques, Soft Computing verses Hard Computing. Applications of Soft Computing in the current industry

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

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, PHI,2004
2. J. Freeman and D. Skapura,Neural Networks: Algorithms, Applications, and Programming Techniques, Addison-Wesley,1991
3. G. J. Klir, and B. Yuan,Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice-Hall,1995
4. S. Rajasekaran and G.A.V.Pai,Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI,2003

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

;

ER Model - Normalization – Query Processing – Query Optimization – Transaction Processing - Concurrency Control – Recovery - Database Tuning – Issues

Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Distributed Database Features - Distributed Data Storage – Fragmentation – Distributed Query Processing – Distributed Transactions – Commit Protocols – Concurrency Control – Recovery

Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL/Oracle

Rules – Knowledge Bases - Active and Deductive Databases – Image databases – Text/Document Databases - Multimedia Databases - Applications – XML Databases

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

REFERENCES:
1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System concepts", Fifth Edition, McGraw Hill, 2006.
4. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
5. V.S.Subramanian, "Principles of Multimedia Database Systems", Harcourt India Pvt Ltd., 2001.
6. Vijay Kumar, "Mobile Database Systems", John Wiley & Sons, 2006.

Outcome:
Gain knowledge and understanding of modern and advanced database technology.

CA7B7 MODELING AND COMPUTER SIMULATION

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

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.

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

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:
1. Michael Havey, "Essential Business Process Modeling", O'Reilly Media; 1 edition, 2005
2. Paul Harmon, "Business Process Change", Morgan Kaufman Publication, 2nd Edition, 2007.
3. Metters, King-Metters, Pullman, Walton, "Business Process Management", Thomson; 1st Edition, 2008
4. Seppanen, Kumar, and Chandra, "Process Analysis and Improvement Tools and Techniques", McGraw Hill Irwin, 2005

Outcome:
An ability to classify and analyze different types of businesses and to identify and solve issues related to Business Processes

ELECTIVES -C
CA7C1 HUMAN COMPUTER INTERACTION

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

Software tools – Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers

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

REFERENCES:
1. Wilbert O Galitz, "The essential guide to user interface design", Wiley Dream Tech.
2. Ben Shneidermann, "Designing the user interface", 3rd Edition, Pearson Education Asia.
3. Alan Dix, Janet Finlay, Gregory Abowd& Russell Beale, "Human-Computer Interaction", 3rd Edition. Prentice Hall, 2004.
4. Julie A. Jacko (Ed), "The Human-Computer Interaction Handbook", (3rd edition) CRC Press, 2012.
5. Jonathan Lazar, Jinjuan Heidi Feng, & Harry Hochheiser, "Research Methods in Human-Computer Interaction", Wiley, 2010
6. PRECE, ROGERS, SHARPS, "Interaction Design", WileyDreamtech.
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.

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", John Wiley and Sons,1998
2. Shanmughavel, P., "Principles of Bioinformatics", Pointer Publishers, 2005.
3. Richard Durbin, Sean Eddy, Anders Krogh, and Graeme Mitchison, "Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids", Cambridge University Press,1998.
4. Bishop M.J., Rawlings C.J. (Eds.), "DNA and protein sequence analysis: A Practical Approach", IRL Press, Oxford, 1997.
5. Doolittle R.F. (Ed.), "Computer methods for macromolecular sequence analysis Methods in Enzymology", Academic Press, 1996

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

CA7C3 MOBILE AND PERVASIVE COMPUTING

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

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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

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 -Mobile Computing through Internet – Mobile Computing through Telephone – Emerging Technologies: - Bluetooth – RFID - Wireless Broadband (WiMax) - Mobile IP

Short Message Service (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

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

Device Technology: Hardware – Human Machine Interfaces – Biometrics – Operating Systems – Java for Pervasive devices

REFERENCES:
1. Ashok K.Talukder and RoopaR.Yuvagal, "Mobile Computing", 2nd Edition, Tata McGraw Hill,2010
2. JochenBurkhardt, Horst Henn, Stefan Heper, Klaus Rindtorff and Thomas Schack, "Pervasive Computing Technology and Architecture of Mobile Internet Applications", Addison Wesley, 2002.
3. UweHansmann, L. Merk, M. Nicllous, T. Stober and U.Hansmann, "Pervasive Computing", Springer Verlag,2003.

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

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CA7C4 MULTICORE ARCHITECTURE

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Objective:
To learn different multi-core programming techniques.
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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

REFERENCES:
1. M. Herlihy and N. Shavit, "The Art of Multiprocessor Programming", Morgan Kaufmann,2008.
2. D.B.Kirk and W.W.Hwu, "Programming Massively Parallel Processors: A Hands-on Approach", Morgan Kaufmann,2010.
3. C.Huges and T.Huges, "Professional Multi-core Programming: Design and Implementation for C++ Developers",Wrox, 2008.

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Outcome:
Ability to program and test on various multi-core systems.
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CA7C5 MOBILE APPLICATION DEVELOPMENT

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

Mobile Devices Profiles - Options for development - Categories of Mobile Applications: SMS - Mobile Websites - Mobile Web Widgets - Native Applications - Games - Utility Apps - Location Based Services(LBS) Apps - Informative Apps - Enterprise Apps

Mobile Information Architecture: Introduction - Sitemaps - Click Streams - Wireframes - Prototyping - Architecture for Different Devices. Mobile Design: Interpreting Design - Elements of Mobile Design - Mobile Design Tools - Designing for Different Device/ Screens

J2ME Overview -J2ME Architecture and Development Environment- Small Computing Device Requirements, Run-Time Environment, MIDlet Programming, Java Language for J2ME, J2ME SDK, J2ME Wireless Toolkit

Google Android: Introduction - Android Development Environment- Development Framework- SDK, Eclipse - Emulator, Android AVD - Project Framework - Apple IOS - RIM Blackberry - Samsung Bada - Nokia Symbian - Microsoft Windows Phone.

REFERENCES:
1. Mobile Design and Development by Brian Fling, O'Reilly Media, Inc 2009
2. J2ME: The Complete Reference, James Keogh, Tata McGrawHill, 2003
3. Smart Phone and Next-Generation Mobile Computing by Pei Zheng and Lionel Ni, Elseveir,2006
4. Beginning Android by Mark L. Murphy , Apress, 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 –Unstructureddata 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
2. Chris Eaton, Dirk Deroos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", Tata McGraw Hill Education, 2012

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

Genetic Algorithms (GA): Biological foundation of GA, 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. Applications of 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. 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:

1. M. Mitchell, An introduction to Genetic Algorithms, Prentice-Hall, 1998.
2. D. E. Goldberg, "Genetic Algorithms in Search, Optimization, and Machine Learning,"Addison Wesley,1989.
3. R.Eberhart, P.Simpson and R.Dobbins, Computational Intelligence - PC Tools, AP Professional, 1996.

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:

1. Christina Prell, Social Network Analysis: History, Theory and Methodology, SAGE Publications Ltd, Publication Year 2011
2. David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a Highly Connected World", 2010
3. Stanley Wasserman and Katherine Faust, " Social Network Analysis: Methods and Applications", Cambridge University Press, 1994
4. Carrington and Scott (eds). The SAGE Handbook on Social Network Analysis SAGE, First Edition 2011

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