

**BHARATHIAR UNIVERSITY : COIMBATORE 641 046**

**M.Phil. / Ph.D. - COMPUTER SCIENCE**

**Part I – Syllabus (Effective from Academic year 2008-2009 onwards)**

PAPER I - Teaching Techniques in Computer Science.

PAPER II - Research Methodology and Trends in Computer Science

PAPER III - 1. Data Warehousing and Mining

2. Digital Image Processing

3. Advance Networking

4. Natural Language Processing

5. Data Compression

6. Agent based Computing

7. Soft Computing

8. Embedded and Real Time Operating Systems

9. Software Testing and Quality Assurance

10. Knowledge Management.

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**M.Phil. / Ph.D. – COMPUTER SCIENCE**

**Part I – Syllabus (Effective from Academic year 2008-2009)**

**Paper I : Teaching Techniques in Computer Science**

**UNIT – I : Higher Education and Learning**

Historical Perspectives ... Objectives and Role of Higher Education ... Learning and Learning Hierarchy ... Information Processing ... Learning Events and Outcomes ... Motivation.

**UNIT – II : Teaching Technology : Designs**

Teaching Technology: Meaning, concept and scope ... Instructional Designs: Objective based, Skill based, Competency based, Learning style based and Model based.

**UNIT – III : Methods and Techniques of Teaching**

Large Group Techniques: Lecture, Modified Lecture, Seminar, Symposium, Panel Discussion, Team Teaching, Project Approach and Workshop ... Small Group Techniques: Group Discussion, Simulation, Role Playing, Buzz Technique, Brain Storming, Case Discussion and Assignment ... Systems Approach in Education.

**UNIT – IV : Measurement and Evaluation in Education**

Educational Evaluation: A Conceptual Framework...Methods of Evaluation ... Self Evaluation and Student Evaluation in Higher Education ... Question Banking ... Diagnostic Testing and Remedial Teaching.

**UNIT – V : Electronic Media in Education**

Instructional Media: Concept, Selection, Use and Variety ..... e-Learning V Resources : e-Learning, e-books, e-journals,etc....Web-based Learning: Access and Teaching Issues.

**TEXT BOOKS :**

For Units I to IV

Vedanayagam, E.G. (1989) Teaching Technology for College Teachers. New Delhi: Sterling Publishers (P) Ltd.

For Unit V

Rajasekar, S. (2005) Computer Education and Educational Computing, Hyderabad: Neelkamal Publications.

**REFERENCE BOOKS :**

Kumar,K.L.(1997) Educational Technology, New Delhi:New Age International (P)Ltd.

Sampathkumar, K., Paneerselvam, A and Santhanam, S. (1990) Introduction to Educational Technology, New Delhi: Sterling Publishers (Pvt.) Ltd.

Tony Bates,A.W. (2005) Technology, e-Learning and Distance Education, New York: Routledge.

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**M.Phil. / Ph.D. – COMPUTER SCIENCE**

**Part I – Syllabus (Effective from Academic year 2008-2009)**

**Paper II : Research Methodology and Trends in Computer Science**

**UNIT – I : Research Methods**

Meaning of Research – Objectives of Research – Motivation in Research – Types of Research – Research Approaches – Significance of Research – research Methods versus Methodology – Research and Scientific Method – Importance of Knowing How Research is done – Research Process – Criteria of good Research – Necessity of Defining the Problem – Technique involved in Defining the Problem – Meaning of Research Design – Need for Research Design – Features of a Good Design – Important Concepts Relating to Research Design – Different Research Design – Data Analysis : Sensitivity Analysis with Data Tables, Goalseek, Scenario Manager, Optimisation with EXCEL Solver, Summarising Data with Histograms and Descriptive Statistics, Pivot Tables, Summarising Data with database statistical functions, using correlation, Multiple Regression, ANOVA, Using Resampling to Analyse Data : - Significance of Report Writing – Different Steps in writing Report – Layout of the Research Report – Types of Reports – Oral Presentation – Mechanics of Writing a research Report – Precautions for Writing Research Reports.

**UNIT – II : Algorithms and Analysis**

Elementary data Structures, Greedy method: Knapsack problem – job sequencing with deadlines – optimal merge patterns, Dynamic Programming: Multistage graphs Optimal binary search trees – 0/1 knapsack – Reliability design – The traveling salesperson problem – Flow shop scheduling, Basic search and traversal techniques: The techniques – Code Optimization – Biconnected components and depth – first search. Backtracking: The 8 – Queens problem – Sum of subsets – Hamiltonian cycles – Knapsack problem.

**UNIT III : Object Oriented Methodology**

Identifying subjects:Definitions-How to determine the subjects-examples.Defining attributes:Definitions-How to determine attributes-instance connections-examples.Defining services:message connections-specifying services final class and object specifications-examples. Design Process – Design Axioms – Designing Classes . Object Oriented Methodology: Rumbaugh, Booch, Jacobson, Shaler/Mellor, Coad/Yardon – Patterns – Frame Works – The Unified Approach – UML

**UNIT IV: CLIENT/SERVER TECHNOLOGY & ADAPTIVE WEB TECHNOLOGY**

Distributed Objects and components – From Distributed Objects to components – 3 Tier Client Server, Object Style – CORBA – Distributed Objects, CORBA style – OMG's object management architecture – CORBA 2.0 – CORBA Object Services – CORBA common facilities – CORBA business objects.

**J2EE:** Overview – Multi – tier Architecture – The Enterprise Application – Clients – Sessions management – Web Tier –ELB Tier – J2EE Web Services. NET Framework – Common Language Runtime – Base Class Libraries – Interoperability – Networking – Remitting - Security. Building Web applications – web Services. Overview of XML.

## **UNIT V: GRID COMPUTING**

Introduction: Early Grid Activities, Current grid activities, Overview of grid business area, Grid Infrastructure and its relationship with other distributed architectures.

Open grid service architecture (OGSA), Data management services, Overview of Globus GT3 Toolkit.

Grid applications: Schedulers, Resource broker, load balancing, grid portals.

### **REFERENCE BOOKS :**

#### **Unit I**

1. C. R. Kothari – Research Methodology Methods and Techniques - Wishwa Prakashan Publishers – Second Edition.
2. Wayne L. Winston, Microsoft Excel Data Analysis and Business Modeling Microsoft Press, 2004, ISBN : 0735619018
3. Dr. Rajammal, P. Devadas – A Handbook on Methodology of Research – Sri Ramakrishna Mission Vidyalaya College of Rural Higher Education.

#### **Unit II**

1. Alfre V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data structures and Algorithms”, Addison – Wesley Publishing Company, 1987.
2. Ellis Harowitz and Sartaj Sahini, “Computer Algorithms”, Galgotier Publications (P) Ltd., 1993.

#### **Unit III**

1. Ali Bahrami, Object Oriented System Development, Mc Graw Hill International Edition
2. Peter Coad and Edward Yourdon, “Object Oriented Analysis”, 2<sup>nd</sup> Edition, Prentice Hall, 1991.
3. Robert Lafore, “Object Oriented Programming and C++”, Galgotia 1991.

#### **Unit IV**

1. Robert Orfali, Dan Harkey, Jerry Edwards, “The Essential Client/Server Survival Guide”, Galgotia Publications.
2. Jim Keogh, “The Complete Reference J2EE”, Tata McGraw-Hill Edition, 2002.
3. James McGovern et al., “J2EE 1.4 Bible”, Wiley Publishing Inc., 2003.
4. Visual Studio .NET Walkthroughs – Microsoft Manual.
5. [www.msdn.microsoft.com/netframework](http://www.msdn.microsoft.com/netframework)

#### **Unit V**

1. Joshy Joseph, Craig Fellenstein, “Grid Computing”, IBM Press, 2004
2. Fran Berman, Anthony J.G Hey, Geoffrey Fox, “Grid computing: Making the global infrastructure a reality”, Wiley, ISBN: 0470853190 ([www.grid2002.org](http://www.grid2002.org))
3. [www.gridbus.org](http://www.gridbus.org), [www. Globus.org](http://www.Globus.org), [www.gridcomputing.com](http://www.gridcomputing.com), [www.gridforum.org](http://www.gridforum.org), [www.grid.org](http://www.grid.org)

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**Part I – Syllabus (Effective from Academic year 2008-2009)**

**Paper III : Data Warehousing and Mining**

**UNIT - I**

Data Warehousing Introduction – Definition-Architecture-Warehouse Schema-Warehouse server-OLAP operations. Data Warehouse technology – Hardware and operating system- Warehousing Software – Extraction tools – Transformation tools – Data quality tools – Data loaders – Data Access and retrieval tools – Data Modelling tools – Fact tables and dimensions Data warehousing case studies : Data warehousing in Government , Tourism, Industry , Genomics data.

**UNIT - II**

Data Mining definition – DM Techniques – current trends in data mining - Different forms of Knowledge – Data selection , cleaning, Integration , Transformation, Reduction and Enrichment . Data: Types of data - Data Quality - Data Preprocessing - Measures of similarity and dissimilarity. Exploration : Summary statistics – Visualization.

**UNIT - III**

Association rules : Introduction – Methods to discover association rule – Apriori algorithm Partition Algorithm – Pincher search algorithm – Dynamic Item set algorithm – FP Tree growth algorithm. Classification : Decision Tree classification – Bayesian Classification – Classification by Back Propogation.

**UNIT - IV**

Clustering Techniques : Introduction – Clustering Paradigms – Partitioning Algorithms – K means & K Mediod algorithms – CLARA – CLARANS – Hierarchical clustering – DBSCAN – BIRCH – Categorical Clustering algorithms – STIRR – ROCK – CACTUS. Introduction to machine learning – Supervised learning – Unsupervised learning – Machine learning and data mining. Neural Networks : Introduction – Use of NN – Working of NN Genetic Algorithm : Introduction –Working of GA

**UNIT – V**

Web Mining : Introduction – Web Content Mining – Web structure mining – web usage mining – Text Mining – Text Clustering Temporal Mining -spatial mining - Visual data mining – Knowledge mining.

### **TEXT BOOKS:**

1. Arun k Pujari , “Data Mining Techniques”, University press , edition 2001.
2. Jaiwei Han, Michelinne Kamber , “Data Mining : Concepts and Techniques “
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, “Introduction to Data Mining”, 2007.
4. T.Sushmita mitra, Tir ku Acharaya , “Data Mining Multimedia , Softcomputing & Bioinformatics”, Wiley Interscience publications , 2004.
5. Michal J A Berry , Gordon Linoff , “Mastering Data Mining” , John Wiley & Sons ,2000.
6. Alex Berson , Stephen J.Smith , “Data Warehousing , Data Mining & OLAP “, Tata McGrawhill
7. C S R Prabhu, “Data Warehousing – concepts , techniques and applications “,Prentice Hall of India, 2<sup>nd</sup> edition , 2002.

### **REFERENCE BOOKS :**

1. David Hand, Heikki Mannila , Padhraic smyth, “Principles of Data Mining”, the MIT Press, Massachusetts Institute of Technology , Cambridge.
2. Usama M Fayyad, Gregory Piatskey Sharpio, Padhr Smyth, Ramasamy Uthurusamy , “Advances in Knowledge discovery and data mining”.
3. Mehmed Kantardzix, ”Data Mining : Concepts Models, methods and algorithms”.
4. Mark Humphries , Michal W Hawkins & Michelle C dy, “Data warehousing architecture and implementation”, Prentice hall of India,1999.
5. Margaret H.Dunham ,”Data Mining :Introductory and advanced topics”.
6. Sumathi, S.N. Sivanandam, “Introduction to Data Mining and its Applications “,Springer.

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**Paper III : Digital Image Processing**

**UNIT - I**

Digital image processing – fundamental steps in image processing – elements of image processing systems. Digital image fundamentals: A simple image model – sampling and quantization – some basic relationships between pixels. Introduction to Fourier transform – the discrete Fourier transform – properties of the two-dimensional Fourier transform. Image Enhancement: Enhancement by point processing – spatial filtering – enhancement in the frequency domain – generation of spatial masks from frequency domain specifications – color image processing

**UNIT - II**

Image restoration: Degradation model – diagonalisation of circulant and block circulant matrices – Algebraic approach to restoration – inverse filtering. Image compression: Fundamentals – image compression models – error-free compression – lossy compression – image compression standards.

**UNIT - III**

Image segmentation: Detection of discontinuities – edge linking and boundary detection – thresholding - region oriented segmentation. Representation and description: representation schemes – boundary descriptors – regional descriptors. Elements of image analysis – Patterns and Pattern classes – decision theoretic methods – structural methods – interpretation

**UNIT - IV**

Image processing – pattern recognition – relationship between image processing and pattern recognition. Object detection: introduction. Shape analysis: introduction – convex hull – convex hull based representation – fractals – fractals based image shape representation.

**UNIT - V**

Wavelets: introduction – properties of wavelets – fast wavelet transform – wavelet decomposition structures and coefficients – inverse fast wavelet transform – application of wavelets in image processing

**TEXT BOOKS :**

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image processing using MATLAB”, Pearson Education, 2004
2. Rafael C. Gonzalez, Richard E. Woods, “Digital Image processing”, 2<sup>nd</sup> ed., Prentice Hall, NJ., 2002
3. Russ J. C., “The image processing handbook”, 3<sup>rd</sup> ed., CRC Press, 1999

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**Paper – III : Advanced Networking**

**Unit – I : Circuit Switching Networks**

AT & T's Dynamic Routing Network, Routing in Telephone Network – Dynamic Non Hierarchical Routing – Trunk Status Map Routing – Real Time Network Routing, Dynamic Alternative Routing – Distributed Adaptive Dynamic Routing – Optimized Dynamic Routing.

**Unit – II : Packet Switching Networks**

Distance Vector Routing-Link State Routing-Inter Domain Routing – Classless Interdomain Routing (CIDR), Interior Gateway Routing Protocols(IGRP) – Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Exterior Gateway Routing Protocol(EGRP)–Border Gateway Protocol(BGP), Apple Talk Routing and SNA Routing

**UNIT – III : High Speed Networks**

Routing in optical networks- The optical layer, Node Designs, Network design and operation, Optical layer cost tradeoffs, Routing and wavelength assignment, Architectural variations, Routing in ATM networks – ATM address structure, ATM Routing, PNNI protocol, PNNI signaling protocol, Routing in the PLANET network and Deflection Routing.

**Unit – IV : Security and Cryptography**

Introduction to Security - Security Attacks, services and Mechanisms – Data Encryption Standard - Advanced Encryption Standard–Public–Key Cryptography and RSA – Message Authentication and Hash Functions – Hash and MAC algorithms – Digital Signatures and Authentication Protocols

**Unit – V : Network Security**

Authentication Applications – Electronic Mail security – IP Security – Web security – Intruders – Malicious Software – Firewalls.

**TEXT BOOKS :**

1. M Steen Strub,“Routing in Communication Networks”,PH International,NY 1995.
2. William Stallings,“ISDN & Broadband ISDN with Frame Relay and ATM”, PHI, ND, 2004.
3. William Stallings, “Cryptography and Network Security”, PHI, 2006

**REFERENCE BOOKS :**

1. “Internetworking Technologies Hand Book”, Fouth Edition, Inc. (CISCO System , ILSG Cisco System 2003)
2. William Stallings, “High Speed Networks TCP/IP and ATM Design Principles”, PH International, NY, 1998.
3. “Behrouy A Ferouzan”, Data Communications and Networking (3/e) TMH, 2004
4. Charlie Kaufman, Radia Rerlman Mike Specines, “Network Security – Private Communication in a Public World”, PHI (2/e) 2002.



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**Paper - III : Natural Language Processing**

**UNIT - I**

Natural Language Processing (NLP) – open problems – major goal – language structure – language analyzer – morphological analyzer – local world grouper (LWG) – core parser – requirements of computational grammars – computational aspect – system aspect – large system aspect – morphological analysis – morphological generation using paradigms – morphological analysis using paradigms – speeding up morphological analysis by compilation – morphological analyzer – additional issues – local word grouping – verb groups – noun groups – strategy for grammar development – semantics in stages.

**UNIT - II**

Paninian grammar – semantic model – free word order and vibhakti – paninian theory – karaka relations – active passive – control – karaka to vibhakti mapping – karaka sharing.

**UNIT - III**

Machine translation – survey – is MT possible? – Possible approaches – current status – anusaraka or language accessor – cutting the Gordian knot – structure of anusaraka systems – user interface – linguistic area – anusaraka output – language bridges.

**UNIT - IV**

Lexical functional grammar – active passive and dative constructions – WH movements in questions – LFG formalism – well formedness conditions – handling WH movements in questions – computational aspects – features and feature structures – unification – other constraints – CFG and Indian languages – functional specification – lexicalized grammars and locality – lexicalized tree substitution grammar – lexicalized tree adjoining grammar – feature structures – mathematical aspects

**UNIT - V**

Comparing TAG with PG – similarities between TAG and PG – differences between TAG and PG – Government and binding – GB modules – X-bar theory – theta theory – Government – Case theory – bounding theory – empty category principle (ECP) – binding theory – constraints on movement – GB parsing – comparing GB with PG

**REFERENCE BOOKS :**

1. Akshar Bharati, Vineet Chaitanya, Rajeev Sangal, “Natural Language Processing – A Paninian Perspective”, Prentice Hall of India, 2000
2. James Allen, Natural Language Understanding, Pearson Education, 3<sup>rd</sup> ed., 2005

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**Paper - III : Data Compression**

**UNIT-I : Introduction**

Compression Techniques – Lossy compression & Lossless compression, modeling and compression Mathematical modeling for Lossless compression- Physical models, probability models, Markov Models and composite source models. Mathematical modeling for Lossy compression – physical models, Probability models and linear systems models.

**UNIT – II : Different Methods of Compression**

**Basic Techniques** : Run length encoding, RLE Text compression, RLE image compression and scalar quantization.

**Statistical Methods** : Information theory concepts, Huffman coding, Adaptive Huffman coding, facsimile compression Arithmetic coding and Adaptive, Arithmetic coding and Text compression.

**Dictionary methods** : String compression, LZ 77, LZSS, LZ78,LZW, Unix compression, GIF image, ARC and PKZIP, Data compression patterns.

Wavelet methods : Fourier Image compression, Multi Resolution decomposition and JPEG 2000.

**UNIT-III : Image Compression**

Intuitive Methods, Image Transforms, JPEG, Progressive Image compression, Vector quantization, Adaptive Vector Quantization, Block Matching, Block Truncation coding. Context Tree weighting, Block Decomposition, Binary Tree predictive coding, Quad Trees and Finite Automata Methods.

**UNIT –IV : Video Compression**

Analog Video, Composite and Components Video, Digital Video, Video compression, MPEG and H.261.

**UNIT – V : Audio Compression**

Sound, Digital Audio, The Human Auditory System,  $\mu$ -Law and A-Law companding, ADPCM Audio compression and MPEPG-1 Audio Layers.

**TEXT BOOKS :**

1. David salomon, “Data compression – The complete Reference”, Springer Publications(2<sup>nd</sup> Edition)
  2. Mark Nelson and Jean-Loup Gailly, “The Data compression Book”, Mark Nelson and Jean-Loup Gailly, BPB publications (2<sup>nd</sup> Edition)
  3. Khalid Sayood, “Introduction to Data Compression”,Harcout India(P) Ltd,New Delhi
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**Paper - III : Agent Based Computing**

**UNIT - I**

Introduction to Software Agents: What is a software agent? - Why software agents? - Applications of Intelligent software agents-Practical design of Intelligent agent systems.

**UNIT - II**

Intelligent Agent Learning- Approaches to Knowledge base development-Disciple approach for building Intelligent agents- Knowledge representation-Generalization- Problem solving methods-Knowledge elicitation.

**UNIT - III**

Rule learning: Rule learning problem- Rule learning method- Learned rule characterization.

Rule refinement: Rule refinement problem- Rule refinement method- Rule experimentation and verification-Refined rule characterization-Agent interactions.

**UNIT - IV**

Disciple shell: Architecture of Disciple shell- Methodology for building Intelligent Agents- Expert-Agent interactions during knowledge elicitation process- Expert-Agent interactions during rule learning process- Expert-Agent interactions during rule refinement process.

**UNIT - V**

Case studies in building Intelligent agents: Intelligent Agents in portfolio management- Intelligent Agents in financial services- Statistical Analysis assessment and support agent- Design assistant for configuring computer systems.

**REFERENCE BOOKS :**

1. Jeffrey M Bradshaw, “Software Agents”, AAAI Press/ The MIT Press, Standard Edition.
2. Nicholas R Jennings, Michael J Wooldridge (Eds.), “Agent Technology – Foundations, Applications and Markets”, Springer, 1997.
3. Gheorghe Tecuci et al., “Building Intelligent Agents”, Academic Press, 2003.
4. Eduardo Alanso, Daniel Kudenko, Dimitar Kazakov (Eds.) “Adaptive Agents and Multi-Agent Systems, Springer Publications, 2003.

## **Paper - III : Soft Computing**

### **UNIT - I**

Fundamentals of ANN: The Biological Neural Network, Artificial Neural Networks - Building Blocks of ANN and ANN terminologies: architecture, setting of weights, activation functions - McCulloch-pitts Neuron Model, Hebbian Learning rule, Perception learning rule, Delta learning rule.

### **UNIT - II**

Models of ANN: Single layer perception, Architecture, Algorithm, application procedure - Feedback Networks: Hopfield Net and BAM - Feed Forward Networks: Back Propagation Network (BPN) and Radial Basis Function Network (RBFN) - Self Organizing Feature Maps: SOM and LVQ

### **UNIT - III**

Fuzzy Sets, properties and operations - Fuzzy relations, cardinality, operations and properties of fuzzy relations, fuzzy composition.

### **UNIT - IV**

Fuzzy variables - Types of membership functions - fuzzy rules: Takagi and Mamdani – fuzzy inference systems: fuzzification, inference, rulebase, defuzzification.

### **UNIT - V**

Genetic Algorithm (GA): Biological terminology – elements of GA: encoding, types of selection, types of crossover, mutation, reinsertion – a simple genetic algorithm – Theoretical foundation: schema, fundamental theorem of GA, building block hypothesis.

### **TEXT BOOKS :**

1. S. N. Sivanandam, S. Sumathi, S.N. Deepa, Introduction to Neural Networks using MATLAB 6.0 , Tata McGraw-Hill, New Delhi, 2006
2. S. N. Sivanandam, S.N. Deepa, Principles of Soft Computing, Wiley-India, 2008.
3. D.E. Goldberg, Genetic algorithms, optimization and machine learning, Addison Wesley 2000.

### **REFERENCE BOOKS :**

1. Satish Kumar, Neural Networks – A Classroom approach, Tata McGraw-Hill, New Delhi, 2007.
2. Martin T. Hagan, Howard B. Demuth, Mark Beale, Neural Network Design, Thomson Learning, India, 2002.
3. B. Kosko, Neural Network and fuzzy systems, PHI, 1996.
4. Klir & Yuan, “Fuzzy sets and fuzzy logic – theory and applications, PHI, 1996.
5. Melanie Mitchell, An introduction to genetic algorithm, PHI, India, 1996.

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**Paper - III : Embedded and Real Time Operating Systems**

**UNIT - I**

Introduction to Embedded Systems-Categories of embedded Systems-specialties of embedded systems- requirements of embedded systems –challenges and issues in embedded software development – recent trends in embedded systems-Architecture of embedded systems: Hardware architecture – software architecture-application software – communication software –Embedded systems on a Chip (SoC) and the use of VLSI designed circuits.

**UNIT - II**

Hardware Fundamentals- Terminology-Gates-Timing Diagrams-Memory- Advanced Hardware Fundamentals- Microprocessors-Microprocessor Architecture-Direct Memory Access - Interrupts and Software Architecture- Interrupts Basics – Interrupt Service Routines- Survey of Software Architectures- Round Robin with interrupts-Function-Queue-Scheduling Architecture-Real Time Operating Systems Architecture.

**UNIT - III**

Applications of Embedded Systems-Application market segments-consumer electronics-control system and industrial automation – biomedical systems- field instrumentation – handheld computers – data communication – networked information appliances – telecommunications – wireless communication.

**UNIT - IV**

Introduction to real time theory-Scheduling theory-rate monotonic scheduling-utilization bound theorem-Introduction to Real time Operating System –Desktop OS vs. RTOS – need for BSP in embedded systems – Issues in Real time computing –Structure of a real time system – task management – race condition – priority inversion – RTOS under the hood – ISRs and scheduling – Inter task communication – timers – programming language and tools.

**UNIT - V**

Case Study-QNX Neutrino, VxWorks, MicroC/OS-II, RTLinux, POSIX, Embedded NT, and Windows XP embedded.

### **TEXT BOOKS :**

1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, First Reprint 2003
2. David E.Simon, an Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.
3. Dreamtech Software Team, Programming for Embedded Systems, Wiley Publishing Inc., 2003  
Ahmed M Ibrahim , Fuzzy logic for Embedded Systems Applications, Newness an imprint of Elsevier, 2004
4. Dr.K.V.K.K Prasad, Embedded/Real Time Systems: Concepts, Design and Programming – The Ultimate Reference, Dreamtech Press, 2003
5. Sriram Iyer, Pankaj Gupta, Embedded Real time Systems Programming , Tata McGraw Hill Publishing Company Limited, 2004

### **REFERENCE BOOKS :**

1. Lewin A.R.W.Edwards, “Embedded System Design on a Shoestring, Newness an imprint of Elsevier
2. C.M. Krishna, Kang G.Shin, Real Time Systems, The McGraw Hill International Editions Computer Science Series.

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**Paper – III : Software Testing and Quality Assurance**

**UNIT - I**

Introduction to software quality – Software modeling – Scope of the software quality program – Establishing quality goals – Purpose, quality of goals – SQA planning software – Productivity and documentation, Software quality assurance plan – Purpose and Scope, Software quality assurance management - Organization – Quality tasks – Responsibilities – Documentation. Standards, Practices, Conventions and Metrics, Reviews and Audits – Management, Technical review – Software inspection process – Walk through process – Audit process – Test processes – ISO, CMM compatibility – Problem reporting and corrective action.

**UNIT - II**

Tools, Techniques and methodologies, Code control, Media control, Supplier control, Records collection, Maintenance and retention, Training and risk management. ISO 9000 model, CMM model, Comparisons, ISO 9000 weaknesses, CMM weaknesses, SPICE – Software Process Improvement and Capability determination.

**UNIT - III**

Purpose of Software testing – Some Dichotomies – a model for testing – Playing pool and consulting oracles – Is complete testing possible – The Consequence of bugs – Taxonomy of Bugs. Software testing Fundamentals – Test case Design – Introduction of Black Box Testing and White Box testing – Flow Graphs and Path testing – Path testing Basics - Predicates, Path Predicates and Achievable Paths - Path Sensitizing – Path Instrumentation –Implementation and Application of Path Testing.

**UNIT - IV**

Transaction Flow testing – Transaction Flows – techniques – Implementation Comments – Data Flow Testing – Basics – Strategies – Applications, Tools and effectiveness – Syntax Testing – Why, What, How – Grammar for formats – Implementation – Tips. Logic Based Testing – Motivational Overview – Decision tables – Path Expressions – KV Charts – Specifications – States, State Graphs and transition Testing – State Graphs – Good & bad states – state testing Metrics and Complexity.

**UNIT - V**

Testing GUIs – Testing Client – Server Architecture – Testing for Real-time System – A Strategic Approach to Software testing – issues – unit testing – Integration Testing – Validation testing – System testing – The art of Debugging.

**REFERENCE BOOKS :**

1. Mordechai Ben – Meachem and Garry S.Marliss, “Software Quality–Producing Practical, Consistent Software”, International Thompson Computer Press, 1997
2. Watt. S. Humphrey, “Managing Software Process”, Addison – Wesley, 1998.
3. Philip.B.Crosby,“Quality is Free:The Art of making quality certain”, Mass Market, 1992
4. Boris Beizer, Software Testing Techniques, Dreamtech Press, Second Edition – 2003.
5. Myers and Glenford.J., The Art of Software Testing, John-Wiley & Sons,1979
6. Roger.S.Pressman, Software Engineering – A Practitioner’s Approach ,Mc-Graw Hill, 5th edition, 2001
7. Marnie.L. Hutcheson, Software Testing Fundamentals, Wiley-India,2007

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**Paper – III : Knowledge Management**

**UNIT - I**

Basics - What is Knowledge Management? - Key Challenges - KM Life Cycle - Understanding Knowledge – Definitions - Cognition and Knowledge Management - Data, Information, and Knowledge - Types of Knowledge - Expert Knowledge.

**UNIT - II**

Knowledge Management System Life Cycle - Challenges in Building KM Systems - Conventional Versus KM System Life Cycle - KM System Life Cycle - System Justification - Role of Rapid Prototyping - Role of Knowledge Developer – User Training.

**UNIT - III**

Knowledge Creation - Nonaka's Model of Knowledge Creation and Transformation - Knowledge Architecture - Capturing Tacit Knowledge – Evaluating the Expert – Developing a relationship with Expert – Fuzzy Reasoning and the Quality of Knowledge Capture – Interview as a tool – Brainstorming – Repertory Grid - Nominal-Group Techniques(NGT) – Delphi method – Concept mapping

**UNIT - IV**

Knowledge Codification - Codification Tools and Procedures - Knowledge Developers Skill Set - Knowledge Transfer - Transfer Methods - Role of the Internet in Knowledge Transfer - Knowledge Transfer in the E-World - E-Business – KM Tools :- Personal KM Tools, What next – from GUI to CIM, Software – Knowledge Technologies :- State of Technology, KM Gets Unconventional, Application is the Key, Content Mgmt, Technology components of KM, ERP and BPR, Meta-data Architecture.

**UNIT - V**

Knowledge Management Tools and Knowledge Portals - Portals Basics - Business Challenge - Knowledge Portal Technologies - Ethical and Legal Issues - Knowledge Owners - Legal Issues - The Ethical Factors – Futuristic KM.

**TEXT BOOKS :**

1. Elias M.Awad, Hassan M.Ghaziri, "Knowledge Management", Pearson Education (Edition 2004).

**REFERENCE BOOKS :**

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