KAKATIYA UNIVERSITY
WARANGAL-506009, TELANGANA.

Ph. D COURSE WORK
Department of Computer Science
Pre-Ph.D Examination Syllabus
For Academic year 2015-16 onwards

Sl. No	Subjects Code	Subject Name	Paper	Remarks
1	CS001	Research Methodology	1	Compulsory
2	CS002	Software Engineering	2	Based on Research Topic
3	CS003	Cloud Computing	2	Based on Research Topic
4	CS004	Big Data Analytics	2	Based on Research Topic
5	CS005	Cloud Security	2	Based on Research Topic
6	CS006	Data warehousing and Data Mining	2	Based on Research Topic
7	CS007	Digital Image Processing	2	Based on Research Topic
8	CS008	Cryptography And Network Security	2	Based on Research Topic
9	CS009	Mobile Computing And Ad-hoc Networks	2	Based on Research Topic
10	CS010	Soft Computing	2	Based on Research Topic

RESEARCH METHODOLOGY

UNIT 1

INTRODUCTION: Meaning, Objectives, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India. DEFINING THE RESEARCH PROBLEM: Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem.

UNIT 2

RESEARCH DESIGN: Meaning, Need for Research Design, Features of a Good Design, Important Concepts relating to Research Design, Different Research Designs. CLUSTER ANALYSIS: Introduction, distance measures Clustering algorithms, agglomerative clustering.

UNIT 3

DATA COLLECTION: Introduction, Experiments and surveys, Collection of Primary and Secondary Data, selection of appropriate method for data collection,case study method. DATA PREPARATION: Data Preparation process, Some problems in preparation process, Missing values and Outliers, types of Analysis, Statistics in research.

UNIT 4

TESTING OF HYPOTHESIS: Hypothesis, Basic Concepts Concerning Testing the Hypotheses, Test Statistic and Critical region, critical value and Decision Rule, Procedure for Hypothesis Testing, Hypothesis Testing for – Means, Proportions, variance, difference of two mean, difference of two proportions, difference of two variances;P-Value approach, power of test, Limitations of the Tests of Hypotheses. Chi-Square Tests.

UNIT 5

INTERPRETATION AND REPORT WRITING: Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, 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.

Citation: MLA and APA, Publication, Impact factor:definition and calculation, H-index : introduction, calculation, g-index, Plagiarism: introduction, Ethics and morals, Copyright, Trademarks and Patents.

REFERENCES:

1. C. R. Kothari –ResearchMethodologyMethodsandTechniques- New Age International Publishers 2014–thirdEdition.
2. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
3. URL: www.wikipedia.org
4. Anderson, T. W., An Introduction to Multivariate Statistical Analysis, Wiley Eastern Pvt., Ltd., New Delhi.
5. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Publications. 2 volumes.
6. MLA(Modern Language Association) Handbook for Writers of Research Papers, 7th edition, 2009.
7. Publication. Manual of the Amerkan Psythological Assudalion (APA), 6th edition 2010
8. Carroll, J. (2002) A Handbook for Deterring Plagiarism in Higher Education. Oxford: Oxford Brookes University (http://www.trafford.ac.uk/static/plato/plagiarism1/intro-plagiarism.html)
9. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
10. Day, R.A., 1992.How to Write and Publish a Scientific Paper, Cambridge University Press.
11. Fink, A., 2009. Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications
12. Coley, S.M. and Scheinberg, C. A., 1990, "Proposal Writing", Sage Publications.
13. Intellectual Property Rights in the Global Economy: Keith Eugene Maskus, Institute for International Economics, Washington, DC, 2000.
14. Subbarau NR-Handbook on Intellectual Property Law and Practice-S Viswanathan Printers and Publishing Private Limited.1998

SOFTWARE ENGINEERING

UNIT 1

Software and Software Engineering: Nature of software, software application domains, unique nature of web applications, software engineering, software process, software engineering practice, software myths. Process Models: Generic process model, prescriptive process models, specialized process models, unified process, personal and team process models, product and process. Agile development: Agility, agile process, extreme programming and other agile process models.

UNIT 2

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. System models: Context Models, Behavioral models, Data models, Object models, structured methods.

UNIT 3

Design concepts: Design process, Design concepts, design model. Architecture Design: Software architecture, architectural styles, architectural design, assessing alternative architectural designs, architectural mappings using data flow. Component-level design: Designing class based components, conducting component level design. Object Oriented Design using UML, Designing class based components, conducting component level design.

UNIT 4

User interface design: The golden rules, user interface analysis and design, interface analysis, interface design steps. Quality concepts: software quality, software quality dilemma, achieving software quality. Software quality assurance: Elements of software quality assurance, sqa tasks, goals. Formal approaches.

UNIT 5

Software testing strategies: A strategic approach to software testing, strategic issues, test strategies for conventional software, validation testing, system testing.

Reference Book:

1. Roger S.Pressman ,"Software Engineering – A Practitioner's Approach 7th Edition 2010, Mc Graw Hill.
2. Ian Sommerville, 'Software Engineering', Sixth Edition, 2001, Pearson Education.
3. Software Engineering By Ghezzi (Phi)
4. Software Engineering Fundamentals By Behforooz And Hudson Oxford University Press
5. Software Engineering By Fairley (Mc.Graw Hill)
6. Software Engineering Theory & Practice By Pfleeger (Pearson)
7. Software Engineering By Kr Agarwal & Yogesh Singh (New Age)
8. Object Oriented Software Engineering by SR Schach (TMH)

CLOUD COMPUTING

UNIT 1

Overview of Computing Paradigm: Recent trends in Computing: Grid Computing, Cluster Computing, Distributed Computing, Utility computing, and Cloud Computing. Evolution of cloud computing: Business driver for adopting cloud computing.

Introduction to Cloud Computing: Cloud Computing (NISTModel): Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers; Properties, Characteristics & Disadvantages: Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing; Role of Open Standards

UNIT 2

Cloud Computing Architecture: Cloud computing stack: Comparison with traditional computing architecture(client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services; Service Models (XaaS):Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS); Deployment Models: Public cloud, Private cloud, Hybrid cloud, Community cloud.

UNIT 3

Infrastructure as a Service (IaaS):Introduction to IaaS, IaaS definition, Introductionto virtualization, Different approaches to virtualization, Hyper-visors, Machine Image, Virtual Machine (VM).

Resource Virtualization: Server,Storage,Network, Virtual Machine(resource) provisioning and manageability, storage as a service, Data storage in cloud computing(storage as a service); Examples: Amazon EC2, Renting, EC2 Compute Unit, Platform and Storage, pricing,customers, Eucalyptus.

Platform as a Service(PaaS):Introduction to PaaS: What is PaaS, Service Oriented Architecture (SOA), Cloud Platform and Management, Computation, Storage, Examples, GoogleApp Engine, Microsoft Azure, SalesForce.com's, Force.com platform.

UNIT 4

Software as a Service (PaaS): Introduction to SaaS, Web services, Web2.0, WebOS,and Case Study on SaaS. Service Management in Cloud Computing: ServiceLevel Agreements(SLAs),Billing& Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefiting enormously, Managing Data, Looking at Data, Scalability & Cloud Services, Database&Data Stores in Cloud, Large Scale Data Processing.

UNIT 5

Cloud Security: Infrastructure Security: Network level security, Host level security, Application level security, Data security and Storage: Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity &Access Management, Access Control, Trust,Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations.

Reference Book

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-india, 2010
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011
3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010

BIG DATA ANALYTICS

UNIT 1

Big Data, Complexity of Big Data, Big Data Processing Architectures, Big Data Technologies, Big Data Business Value, Data Warehouse, Re-Engineering the Data Warehouse, Workload Management in the Data Warehouse, New Technology Approaches.

UNIT 2

Integration of Big Data and Data Warehouse, Data Driven Architecture, Information Management and Lifecycle, Big Data Analytics, Visualization and Data Scientist, Implementing The "Big Data" Data. Choices in Setting up R for Business Analytics, R Interfaces, Manipulating Data, Exploring Data, Building Regression Models, Clustering and Data Segmentation, Forecasting and Time Series Models.

UNIT 3

Writing Hadoop Map Reduce Programs, Integrating R and Hadoop, Using Hadoop Streaming with R, Learning Data Analytics with R and Hadoop, Understanding Big Data Analysis with Machine Learning. Big Data, Web Data, A Cross-Section of Big Data Sources and the Value They Hold, Taming Big Data, The Evolution of Analytic Scalability.

UNIT 4

The Evolution of Analytic Processes, The Evolution of Analytic, Processes The Evolution of Analytic Tools and Methods. Legacy Data, Hypothesis Testing, Prediction, Software, Complexity, Business problems suited to big data analytics.

UNIT 5

High Performance Appliances for Big Data Management, Using Graph analytics, The New Information Management Paradigm, Big Data's Implication for Businesses, Big Data Implications for Information Management, Splunk's Basic Operations on Big Data.

References:

1. Data Warehousing in the Age of Big Data by Krish Krishnan, Morgan Kaufmann.
2. A.Ohri, “R for Business Analytics”, Springer, 2012.
3. Big Data Analytics with R and Hadoop by Vignesh Prajapati
4. Principles of Big Data Preparing, Sharing, and Analyzing Complex Information, 1st Edition, by J Berman, published by Morgan Kaufmann
5. “Big Data Analytics - From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph” By David Loshin, Morgan Kaufmann
6. Big Data Imperatives: Enterprise 'big Data' Warehouse, 'BI' Implementations and Analytics by Soumendra Mohanty, Apress
7. Big Data Analytics Using Splunk By Peter Zadrozny , Raghu Kodali, Apress 2013
8. Franks, Bill, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, Wiley, 1st Edition, 2012.

CLOUD SECURITY

UNIT 1

Security Concepts: Confidentiality, privacy, integrity, authentication, non-repudiation, availability, access control, defence in depth, least privilege, how these concepts apply in the cloud, what these concepts mean and their importance in PaaS, IaaS and SaaS. e.g. User authentication in the cloud;

Cryptographic Systems: Symmetric cryptography, stream ciphers, block ciphers, modes of operation, public-key cryptography, hashing, digital signatures, public-key infrastructures, key management, X.509 certificates, OpenSSL.

UNIT 2

Multi-tenancy Issues: Isolation of users/VMs from each other. How the cloud provider can provide this;

Virtualization System Security Issues: e.g. ESX and ESXi Security, ESX file system security, storage considerations, backup and recovery;

UNIT 3

Virtualization System Vulnerabilities: Management console vulnerabilities, management server vulnerabilities, administrative VM vulnerabilities, guest VM vulnerabilities, hypervisor vulnerabilities, hypervisor escape vulnerabilities, configuration issues, malware (botnets etc).

UNIT 4

Virtualization System-Specific Attacks: Guest hopping, attacks on the VM (delete the VM, attack on the control of the VM, code or file injection into the virtualized file structure), VM migration attack, hyperjacking.

Technologies for Virtualization-Based Security Enhancement: IBM security virtual server protection, virtualization-based sandboxing;

UNIT 5

Storage Security: HIDPS, log management, Data Loss Prevention. Location of the Perimeter. Legal and Compliance Issues: Responsibility, ownership of data, right to penetration test. Local law where data is held, examination of modern Security Standards (eg PCIDSS), how standards deal with cloud services and virtualization, compliance for the cloud provider vs. compliance for the customer.

Reference Books:

1. Tim Mather, Subra Kumaraswamy, Shahed Latif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance [ISBN: 0596802765]
2. Ronald L. Krutz, Russell Dean Vines, Cloud Security [ISBN: 0470589876]
3. John Rittinghouse, James Ransome, Cloud Computing [ISBN: 1439806802]
4. J.R. ("Vic") Winkler, Securing the Cloud [ISBN: 1597495921]

DATA WARE HOUSING & DATA MINING

UNIT 1

The compelling need for data warehousing: Escalating need for strategies information, Failures of Past Decision-Supporting System, Operational Versus Decision-Supporting System, Data Warehousing- The only Viable Solution, data Warehouse Defined. The Building Blocks: Defining Features, Data Warehouse and Data Marts, Overview of the Components, Metadata in the Data Warehouse. Planning and Planning Management: Planning your Data Warehousing, The Data Warehouse Project, The project team, Project Management Considerations. Defining the Business Requirement: Dimension Analysis, Information Package- A New Concept, Requirements Gathering Methods, Requirements Definition: Scope and content. Requirements as the Driving force for Data Warehousing: Data Design, The Architectural Plan, Data Storage Specification, and Information Delivery Strategy.

UNIT 2

The Architectural Component: Understanding Data Warehouse Architecture, Distinguishing Characteristics, Architectural framework, Technical Architecture. Infrastructure as the Foundation for Data Warehousing: Infrastructure Support Architecture, Hardware Operational System, Database Software, Collection of Tools. The Significant Role of Metadata: Why Metadata is Important, Metadata Types by Functional Areas, Business Metadata, How to Provide Metadata. Principles of Dimensional Modeling: From Requirement to Data Design, The STAR Schema, STAR Schema keys, Advantages of STAR Schema. Dimensional Modeling: Updates to the Dimensional Tables, Miscellaneous Dimensions, The Snowflake Schema, Aggregate Fact Tables, and Families of STARS. Data Extraction, Transformation, and Loading. OLAP in the Data Warehouse: Demand for Online Analytical Processing, Major Features and Functions, OLAP Models, OLAP Implementation Consideration

UNIT 3

Introduction: Data mining, kinds of data mined, kinds of patterns mined, technologies used: statistics, Machine learning, Database systems and Data Warehousing, Information Retrieval, Major issues in Data Mining: Mining methodology, User Interaction, Efficiency and Scalability, Diversity and database types, Data Mining & society. Types of mining: Neural Network, Genetic Algorithm, Rough Set, Support Vector Machine, Web Mining, Text Mining, Sequence Mining, Spatial Mining.

UNIT 4

Data Preprocessing: Overview, Data cleaning, Data Integration, Data Reduction, Data Transformation, Data cleaning: Missing Values, Noisy data, Data cleaning as a process. Data Integration: Entity identification problem, Redundancy and Correlation Analysis, Tuple duplication, Data value conflict detection and Resolution. Data Reduction: Overview, wavelet transforms, Principle components Analysis, Attribute subset selection, Regression and log-linear models, Histograms, clustering, sampling, Data cube Aggregation. Data Transformation and Data Discretization by Binning,

Discretization by Histogram Analysis, Discretization by cluster, Decision Tree and correlation Analysis, concept Hierarchy generation for Nominal data.

UNIT 5

Mining Frequent Patterns, Association and Correlations: Basic Concepts, Frequent itemset Mining methods: Apriori Algorithm, Generate Association rules from Frequent itemsets, Improving the efficiency of Apriori, A pattern-growth approach for mining frequent itemsets, using frequent itemset using Vertical data format, Mining closed and max. Patterns. Pattern Evaluation Methods, Advanced Pattern Mining: A Road map, Pattern mining in Multilevel, Multidimensional space, Constraint Based Frequent Mining, Classification: Basic Concepts, Decision Tree induction, Bayes Classification Method, Rule based Classification, Model evaluation & selection, techniques to improve classification accuracy. Classification Advanced Methods: Bayesian Belief networks, Classification by Back Propagation, Support Vector Method, Classification using frequent Patterns, lazy learners, other classification methods. Cluster Analysis: Basic Concepts & Methods, Cluster Analysis, partitioning methods, Hierarchical Methods, Density based Methods, Grid based Methods, Evaluation of Clustering. Advanced Cluster Analysis: Probabilistic Model based Clustering, Clustering High Dimensional Data, Clustering Graph & Network data, Clustering & Constraints.

Reference Books:

1. Data Mining Concept & Techniques, Jiawei Han Micheline Kamber Jian Pei, 3rd Edition, M K Publishers.
2. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley Student Edition
3. Data Mining Techniques – Arun K Pujari, University Press.
4. Data Warehousing in the real world, low price edition, Sam Anahory, Dennis Murray, Pearson Education.
5. Data warehousing Tool kit
6. Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management by Gordon S. Linoff and Michael J. Berry (Apr 12, 2011).
7. Data Mining: A Tutorial Based Primer by Richard Roiger and Michael Geatz (Oct 6, 2002).
8. Data Mining Introductory And Advanced Topics –Margaret H Dunham, Pearson Education
9. Data Warehousing In The Real World – Sam Anahory & Dennis Murray. Pearson Edn Asia.
10. The Data Warehouse Life Cycle Tool Kit – Ralph Kimball Wiley Student Edition
11. Data Warehousing, Data Mining & Olap By Alex Berson And Stephen J. Smith (TMH)
12. Data Warehousing By S Mohanthy (TMH)
13. Data Warehousing Using Oracle By Deshpande (Dreamtech)
14. Data Warehousing By Amitesh Sinha (Thomson)
15. Tan- Data mining concepts, pearson.

DIGITAL IMAGE PROCESSING

UNIT 1

Introduction: Digital Image Processing, Fundamental steps in Digital Image Processing, Components of an Image Processing System. Digital Image Fundamentals: Visual Perception, Image sensing & Acquisition, Image Sampling & Quantization, Some Basic Relationships between Pixels.

UNIT 2

Image Enhancement in the Spatial Domain: Some basic Gray level Transformations, Histogram Processing, Enhancement using Arithmetic/Logic Operations, Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement methods.

UNIT 3

Image Enhancement in the Frequency Domain: Fourier Transform and the Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency Domain Filters, Homomorphism Filtering, Implementation.

UNIT 4

Image Restoration: Image Degradation/Restoration Process, Linear, Position-Invariant Degradations, Inverse Filtering, Minimum, Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering. Wavelets and MultiResolution Processing : MultiResolution Expansions, Wavelet Transforms in One dimension, The Fast Wavelet Transform, Wavelet Transforms in Two Dimensions.

UNIT 5

Image Compression: Image Compression Models, Error-Free Compression, Lossy Compression, Image Compression Standards. Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation.

Reference Books:

1. Rafael C.Gonzalez, Richard E. Woods; “Digital Image Processing ‘Addison Wesley Pubs (Second Edition), 2007.
2. Milan Sonka, Vaclav Hlavac, Roger Boyle Image Processing. Analysis, and Machine Vision (Second Edition, 2003).
3. A.K.Jain, ‘Fundamentals of Digital Image Processing’ PHI, `1999.

CRYPTOGRAPHY AND NETWORK SECURITY

UNIT 1

Understanding Computer Network Security: Securing the Computer Network Forms of Protection, Security Standards. Security Threats to Computer Networks: Sources of Security Threats, Security Threat Motives, Security Threat Management, Security Threat Correlation, Security Threat Awareness. Computer Network Vulnerabilities: Sources of Vulnerabilities, Vulnerability Assessment. Cyber Crimes and Hackers: Cyber Crimes, Hackers, Dealing with the Rising Tide of Cyber Crimes. Hostile Scripts: Introduction to the Common Gateway Interface (CGI), CGI Scripts in a Three-Way Handshake, Server–CGI Interface, CGI Script Security Issues, Web Script Security Issues, Dealing with the Script Security Problems, Scripting Languages. Security Assessment, Analysis, and Assurance: System Security Policy, Building a Security Policy, Security Requirements Specification, Threat Identication, Threat Analysis, Vulnerability Identification and Assessment, Security Certification, Security Monitoring and Auditing, Products and Services.

UNIT 2

Disaster Management: Disaster Prevention, Disaster Response, Disaster Recovery, Make your Business Disaster Ready, Resources for Disaster Planning and Recovery. Access Control and Authorization: Access Rights, Access Control Systems, Authorization, Types of Authorization Systems, Authorization Principles, Authorization Granularity, Web Access and Authorization. Authentication: Multiple Factors and Effectiveness of Authentication, Authentication Elements, Types of Authentication, Authentication Methods, Developing an Authentication Policy.

UNIT 3

Firewalls: Types of Firewalls, Configuration and Implementation of a Firewall, The Demilitarized Zone (DMZ), Improving Security Through the Firewall, Firewall Forensics, Firewall Services and Limitations. System Intrusion Detection and Prevention: Intrusion Detection, Intrusion Detection Systems (IDSs), Types of Intrusion Detection Systems, the Changing Nature of IDS Tools, Other Types of Intrusion Detection Systems, Response to System Intrusion, Challenges to Intrusion Detection Systems, Implementing an Intrusion Detection System, Intrusion Prevention Systems (IPSs), Intrusion Detection Tools.

UNIT 4

Computer and Network Forensics: Computer Forensics, Network Forensics, Forensics Tools. Virus and Content Filtering: Scanning, Filtering, and Blocking, Virus Filtering, Content Filtering, Spam. Computer Network Security Protocols: Application Level Security, Security in the Transport Layer, Security in the Network Layer, Security in the Link Layer and over LANS. Security in Wireless Networks and Devices: Cellular Wireless Communication Network Infrastructure, Wireless LAN (WLAN) or Wireless Fidelity (Wi-Fi), Standards for Wireless Networks, Security in Wireless Networks. Security in Sensor Networks: The Growth of Sensor Networks, Design Factors in Sensor Networks, Security in Sensor Networks, Security Mechanisms and Best Practices for Sensor, Trends in Sensor Network Security Research.

UNIT 5

Security Beyond Computer Networks: Information Assurance: Collective Security Initiatives and Best Practices. Network Perimeter Security: General Framework, Packet Filters, circuit Gateways, Application Gateways, Trusted Systems and Bastion Hosts, Firewall Configurations, Network Address Translations, Setting Up Firewalls. The Art of Anti Malicious Software: Viruses, Worms, Virus Defence, Trojan Horses, Hoaxes, Peer-to- Peer Security, Web Security, Distributed Denial of Service Attacks. The Art of Intrusion Detection: Basic Ideas of Intrusion Detection, Network-Based Detections and Host-Based Detections, Signature Detections, Statistical Analysis, Behavioural Data Forensics, Honeypots.

References:

1. Computer Network Security- Theory and Practice by Jie Wang, 2009 edition, Higher Education Press, Beijing and Springer-Verlag.
2. A Guide to Computer Network Security by Joseph Migga Kizza, 2009 Edition, Springer-Verlag London Limited.
3. Network Security Essentials- Applications and Standards by William Stallings, 4th edition.
4. Modern Cryptography: Theory and Practice by Wenbo Mao Hewlett-Packard Company, 1st edition, Prentice Hall PTR.
5. Network Security: Private Communication in a Public World by Charlie Kaufman, Radia Perlman, Mike Speciner, 2nd edition.
6. Cryptography and Network Security: Principles and Practice by William Stallings, 6th edition.

MOBILE COMPUTING AND ADHOC NETWORKS

UNIT 1

Introduction to Mobile Communications and Computing: Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture.
GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.
(Wireless) Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

UNIT 2

Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).
Mobile Transport Layer : Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

UNIT 3

Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.
Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

UNIT 4

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

UNIT 5

Protocols and Tools: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

REFERENCES:

1. Jochen Schiller,"Mobile Communications",Addison-Wesley. (Chapters 4, 7, 9, 10, 11), second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028. (Chapters 11, 15, 17, 26 and 27)
3. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004

4. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, 2005.
5. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer, second edition, 2003.
6. Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley DreamTech, 2003.

SOFT COMPUTING

Unit - 1

Introduction: Artificial Neural Networks , Advantages of Neural Networks, Application Scope of Neural Networks, Fuzzy Logic, Genetic Algorithm, Hybrid Systems, Neuro Fuzzy Hybrid System, Neuro Genetic Hybrid System

Artificial Neural Networks(ANN):Biological Neural Networks, Brain vs Computer Comparison between biological neural and artificial neural, Evaluation of Neural Networks, Basic Models of Artificial Neural Networks , Supervised Learning, Un-Supervised Learning, Reinforcement Learning, Activation Functions, Important Terminologies of ANN's.

Unit - 2

Introduction to Fuzzy Logic: Classical Sets and Fuzzy Sets, Introduction to Fuzzy Logic, Classical Sets (Crisp Sets), Operations on Classical Sets, Properties of Classical Sets, Function Mapping of Classical Sets, Fuzzy Sets, Fuzzy Set Operations, Properties of Fuzzy Sets.

Classical Relations and Fuzzy Relations: Introduction, Cartesian product of Relation, Classical Relation, Cardinality of Classical Relation, Operations on Classical Relation, Properties of Crisp Relations, Composition of Classical Relations, Fuzzy Relations, Operations on Fuzzy Relations, Properties of Fuzzy Relations, Fuzzy Composition, Tolerance and Equivalence Relations, Classical Equivalence Relation.

Unit - 3

Membership Functions: Introduction, Features of the Membership Functions, Fuzzification, Methods of Membership Value Assignments, Intuition, Inference, Rank Ordering, Angular Fuzzy Sets, Neural Networks, Genetic Algorithms, Induction Reasoning.

Defuzzification: Introduction, Lambda-Cuts for Fuzzy Sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations, Defuzzification Methods, Max-Membership Principle, Centroid Method, Weighted Average Method, Mean-Max Membership, Center of Sums.

Unit - 4

Fuzzy Arithmetic and Fuzzy Measures: Introduction: Fuzzy Arithmetic, Interval Analysis of Uncertain Values, Fuzzy Numbers, Fuzzy Ordering, Fuzzy Vectors.

Fuzzy Rule Base and Fuzzy Inference System (FIS): Introduction, Truth Values and Tables in Fuzzy Logic, Fuzzy Propositions, Formation of Rules, Decomposition of Rules (Compound Rules), Aggregation of Fuzzy Rules, Fuzzy Inference System (FIS), Construction and Working Principles of FIS, Methods of FIS , Overview of Fuzzy Expert System.

Fuzzy Logic Control System: Introduction, Control System Design, Architecture and Operation of FLC System, FLC System Methods, Applications of FLC Systems.

Unit - 5

Genetic Algorithm: Introduction, Genetic Algorithms vs. Traditional Algorithms, Basic Terminologies in Genetic Algorithms - Individuals, Genes, Fitness, Populations, Simple Genetic Algorithms, General Genetic Algorithms.

Hybrid Soft Computing Techniques: Introduction, Neuro-Fuzzy Hybrid Systems, Comparisons of Fuzzy Systems with Neural Networks, Characteristics of Neuro-Fuzzy Hybrids, Classifications of Neuro-Fuzzy Hybrid Systems, Cooperative Neural Fuzzy Systems, General Neuro-Fuzzy Hybrid Systems(General NFHS).

Reference Books:

1. S.N.Sivanandam, S.N.Deepa, “Principles of Soft Computing”, Second Edition, Wiley Publications.
2. Zimmermann H.S, "Fuzzy Set Theory and its Applications". Kluwer Academic Publishers.
3. Satish Kumar, "Neural Networks A Classroom Approach", Tata McGrawHill.
4. Jang sun, Mizutani. “Neuro Fuzzy Soft Computing”, Pearson Education,2005.
5. David E.Goldberg, “Genetic Algorithms in Search Optimization and Machine Learning” Pearson Education.

KAKATIYA UNIVERSITY, WARANGAL

Department of Computer Science

Model Question Paper- Pre-Ph.D Examination

Note: Questions are to be asked from the respective units of syllabus copy enclosed.

Max Hours: 3-Hours **Max Marks: 100**

Answer all questions, each question carries 20 Marks. 5X 20=100

UNIT-I

Q.1 (a)
(b)
(OR)
Q.2 (a)
(b)

UNIT-II

Q.3 (a)
(b)
(OR)
Q.4 (a)
(b)

UNIT-III

Q.5 (a)
(b)
(OR)
Q.6 (a)
(b)

UNIT-IV

Q.7 (a)
(b)
(OR)
Q.8 (a)
(b)

UNIT-V

Q.9 (a)
(b)
(OR)
Q.10 (a)
(b)