w.e.f. Session 2015-16

SCHEME OF EXAMINATION FOR M.TECH. COMPUTER ENGINEERING								
Paper Code	**Nomenclature**	**Time**	**Lectures/ week**	**External marks**		**Internal marks**		**Total**
				Max	**Pass**	**Max.**	**Pass**	
First Semester								
MT-110	Soft Computing	3	5	80	32	20	8	100
MT-120	Advanced DS and Analysis of Algorithms	3	5	80	32	20	8	100
MT-130	High Speed Networks	3	5	80	32	20	8	100
MT-140	Theory of Computation	3	5	80	32	20	8	100
MT-150	Elective I	3	5	80	32	20	8	100
MT-160	S/W Lab - I (Based on Soft Computing)		5	80	32	20	8	100
MT-170	S/W Lab - I (Based on Advanced DS and Analysis of Algorithms)		5	80	32	20	8	100
MT-180	Seminar					50	20	50
						Total Marks		750
Elective Papers								
MT-150 (i) Digital Image Processing								
MT-150 (ii) Software Testing								
MT-150 (iii) Multimedia Technology								

MT-110 SOFT COMPUTING

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.

Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit -1 Neural Networks

History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training

Unit - 2 ANN Algorithms

Perceptron, Training rules, Delta, Back Propagation Algorithm, Multilayer Perception Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

Unit -3 Fuzzy Logic

Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.

Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

Unit – 4 Genetic Algorithms

Genetic Algorithms, Scope & application areas, Search Space in Genetic Algorithms, Operators of Genetic Algorithms : Selection, Crossover, Mutation. Effect of GA Operators, Solution of 0-1Knapsack problem, Travelling Salesman Problems using GA.

REFERENCES:

1. "Fuzzy sets and Fuzzy Logic: Theory and applications",G.J. Klir,B.Yuan, PHI
2. "Introduction to Fuzzy sets and Fuzzy Logic", M.Ganesh , PHI
3. "An Introduction to Fuzzy Control", D Driankov, H Hellendoorn, M Reinfrank, Narosa Publishing Company
4. " Neural Networks: A classroom approach", Satish Kumar , Tata McGraw Hill
5. Haykin S., "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
6. Anderson J.A., "An Introduction to Neural Networks", PHI, 1999

MT-120 ADVANCED DATA STRUCTURES AND ALGORITHMS

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.
Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit

Unit I

Basic Concepts of OOPs ,Templates Function and class templates ,Algorithms: performance analysis: time complexity and space complexity, List (Singly,Doubly and Circular) Implementation ,Array ,Pointer.

Unit II

Stacks and Queues, Trees, General,Binary,Binary Search, AVL ,Introduction to Red Black trees and Splay tree ,B Trees,Implementations ,Tree Traversals

Unit III

Set ,Implementation ,Basic Operations on Set ,Priority Queue ,Implementation ,Graphs,Directed Graphs ,Shortest Path Problem ,Undirected Graph ,Spanning Trees

,Graph Traversals:hash table representation: hash functions: collision resolution:separate chaining: open addressing:linear probing: quadratic probing: double hashing: rehashing

Unit IV:

Searching Techniques ,Sorting ,Internal Sorting ,Bubble Sort ,Insertion Sort ,Quick Sort ,Heap Sort ,Bucket Sort ,Radix Sort ,External Sorting ,Merge Sort ,Multiway Merge Sort ,Polyphase Sorting ,Design Techniques ,Divide and Conquer ,Dynamic Programming ,Greedy Algorithm ,Backtracking ,Local Search Algorithms

REFERENCES:

1. Mark Allen Weiss, —Data Structures and Algorithm Analysis in C++‖, Pearson

Education, 2002.

2. Aho Hopcroft Ullman, —Data Structures and Algorithms‖, Pearson Education,
2002.

3. Horowitz Sahni, Rajasekaran, —Computer Algorithms‖, Galgotia, 2000.

4. Tanenbaum A.S, Langram Y, Augestien M.J., ‖Data Structures using C & C++‖,
Prentice Hall of India, 2002.

5. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.

6. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.

MT-130 HIGH SPEED NETWORKS

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.
Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit

UNIT 1

Gigabit Ethernet : overview of fast Ethernet, IEEE 802.3z standard, protocol architecture, Gigabit Ethernet, applications, 10GB Ethernet.
Wireless Networks : Existing & Emerging standards, Wireless LAN(802.11), Broadband Wireless(802.16), Bluetooth(802.15) their architecture, protocol stack and frame format. Mobile Networks
Fibre Channel : Fibre channel characteristics, topology, ports, layered model, session management, flow control, addressing, SAN.

UNIT 2

Frame Relay : Protocol architecture, frame format, routing.
ISDN & B,ISDN : Channels, interfaces, addressing, protocol architecture, services.
ATM : Virtual circuits, cell switching, reference model, traffic management.

UNIT 3

N/W analysis & modeling : Probability and network queuing models(Little's theorem, M/M/1, M/M/m, M/M/∞, M/G/1), modeling network as a graph.
Open queuing network(Jackson's Theorem) and closed queuing networks, managing network performance.
QOS Protocols : Overview of QoS protocols(RSVP, RTP).

UNIT 4

Internet Layer : IPV4 and IPV6, IP addressing, ARP, IP routing(OSPF & BGP), internet multicasting, mobile IP.
Transport Layer : UDP/TCP protocols & architecture, TCP connection management, wireless TCP.
Application Layer : DNS, FTP, Voice over IP, audio & video compression.

References :

1. "Building high speed Networks", Tere Parnell, TMH.
2. " High Speed Networks and Internets", William stalling, Pearson Education.

MT-140 THEORY OF COMPUTATION

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.
Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit

Unit 1

Finite Automata, Deterministic finite automata, Non deterministic finite automata, finite automata with epsilon transitions. Application of finite automata.
Regular Expressions, finite automata and regular expressions, algebraic laws of regular expressions, Application of regular expression.

Unit 2

Context free grammars, The language of a grammar, sentential form, parse trees, ambiguity in grammars and languages, Applications of context free grammar.
Normal forms for context free grammer, Chomsky normal form, The pumping lemma for context free languages. Decision properties of context free language.

Unit 3

Push down automata, Languages of a PDA,. parsing and pushdown automation.

Unit 4

Turing machine, Programming techniques for turing machine, restricted turing machines, turing machine and computers.

References:

1. Introduction to automata theory, language & computations, Hopcroft & O.D. Ullman, R. Mothwani. AW, 2001
2. Theory of Computer Science(automata, languages, and computation): K.L.P Mishra and N. Chandrasekaran, PHI,2000

3. Introduction to formal languages & automata, Peter Linz, Narosa Pub. 2001.
4. Fundamentals of the theory of computation, principles and practice by Ramond Greenlaw and H . James Hoover, Harcourt India Pvt. Ltd.1998.
5. Elements of theory of computation by H.R. Lewis & C.H. Papaditriou, PHI,1998.

MT-150 **(i)** **DIGITAL IMAGE PROCESSING**

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.
Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit

Unit 1

Introduction: Background, Digital Image Representation, Fundamental Steps in Image Processing, Elements of a Digital Image Processing System.

Digital Image Fundamentals: Elements of Visual Perception, A Simple Image Model, Sampling and Quantization, Some Basic Relationships between Pixels, Imagining Geometry.

Unit 2

Image Transforms: Introduction to the Fourier Transform, The Discrete Fourier Transform, Some Properties of the Two,Dimensional Fourier Transform, Other Separable Image Transforms.

Image Enhancement : Spatial Domain Methods, Frequency Domain Methods, Some Simple Intensity Transformations, Histogram Processing, Image Subtraction, Image Averaging, Background, Smoothing Filters, Sharpening Filters, Lowpass Filtering, Highpass Filtering, Generation of Spatial Masks from Frequency Domain Specifications.

Unit 3

Image Restoring: Degradations Model , Definitions, Degradation Model for Continuous Functions, Diagonalization of Circulant and Block,Circulant Matrices, Circulant Matrices, Block Circulant Matrices, Effects of Diagonalization on the Degradation Model, Algebraic Approach to Restoration, Unconstrained Restoration,

Constrained Restoration, Inverse Filtering – Formulation, Removal of Blur Caused by Uniform Linear Motion, Restoration in the Spatial Domain, Geometric Transformation.

Unit 4

Image Compression: Fundamentals – Coding Redundancy, Interpixel Redundancy, Psychovisual Redundancy, Fidelity Criteria. Image Compression Models – The Source Encoder and Decoder, The Channel Encoder and Decoder. Elements of Information Theory – Measuring Information, The Information Channel, Fundamental Coding Theorems, Using Information Theory. Error,Free Compression – Variable,Length Coding, Bit,Plane Coding, Lossless Predictive Coding. Lossy Compression – Lossy Predictive Coding, Transform Coding.

Text Book:

1. Rafael. C. Gonzalez & Richard E.Woods., Digital Image Processing, 2/e Pearson Education, New Delhi , 2006

Reference Books:

1. W.K.Pratt.,Digital Image Processing ,3/e Edn., John Wiley & sons, Inc. 2006

2. M. Sonka et.al Image Processing, Analysis and Machine Vision, 2/e, Thomson, Learning, India Edition, 2007.

MT-150 (ii) SOFTWARE TESTING

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.
Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit

Unit 1 Introduction

Definition of testing, goals, psychology, model for testing, effective testing, limitations of testing, Importance of Testing.

Unit 2 Testing terminology and Methodology

Definition of Failure, faults or bug, error, incident, test case, test ware, life cycle of bug, bug effects, bug classification, test case design, testing methodology, development of test strategy, verification, validation, testing life cycle model, testing techniques, testing principles, Testing Metrices.

Unit 3 Verification and validation

Verification activities, verification of requirements, verification of HL design, verification of data design, verification of architectural design, verification of UI design, verification of LL design, introduction to validation activities

Black Box testing: Boundary value analysis, equivalence class portioning, state table based testing, decision table based, grappling, error guessing.
White Box testing: Logic coverage criteria, basic path testing, graph matrices, loop testing, data flow testing, mutation testing
Static testing: Types of static testing, technical reviews, inspections, inspection process, structured walk through, walk through process, adv. Of static testing
Validation Testing: Unit testing, drivers , stubs, integration testing, methods, effect of module coupling and cohesion, functional testing, system testing, recovery testing, security testing, stress testing, performance testing, usability testing

Unit 4 Test Automation and debugging

S/w measurement and testing, testing metrics, tools debugging, debugging techniques, design of practical test cases, reducing no. of test cases, Progressive vs. regression testing and test case mgmt, Regression Testability, Regression Testing Techniques.

Text books:,

1. G.J Myers, The Art of Software Testing, John Wiley & Sons, 1979
2. Naresh Chauhan,Software Testing Principles and Practices,OXFORD University Press.

MT-150 (iii) MULTIMEDIA TECHNOLOGY

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.
Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit

UNIT – I

Concept of Multimedia, Multimedia Applications, Hardware Software requirements, Multimedia products & its evaluation.
Components of multimedia: Text, Graphics, Audio, Video., Compression techniques

UNIT – II

Introduction, Basic Terminology techniques, Motion Graphics 2D & 3D animation. Introduction to MAYA (Animating Tool):

UNIT – III

Fundamentals, Modeling: NURBS, Polygon,Subdivisions,Organic, animation, paths & boxes, deformers.

UNIT – IV
Working with MEL: Basics & Programming,Dynamics

Rendering & Special Effects: Shading & Texturing Surfaces, Lighting, Special effects.

TEXT BOOKS:

1. David Hillman, "Multimedia Technology & Applications", Galgotia Publications,2000

2. Rajneesh Agrawal, "Multimedia Systems", Excel Books,2000

w.e.f. Session 2015-16

SCHEME OF EXAMINATION FOR M.TECH. COMPUTER ENGINEERING

Paper Code	Nomenclature	Time	Lectures/ week	External marks		Internal marks		Total
				Max.	Pass	Max.	Pass	
Second Semester								
MT-210	Distributed Operating System	3	5	80	32	20	8	100
MT-220	Advanced Data Base Management System	3	5	80	32	20	8	100
MT-230	Knowledge and Discovery Management	3	5	80	32	20	8	100
MT-240	Compiler Construction	3	5	80	32	20	8	100
MT-250	Elective II	3	5	80	32	20	8	100
MT-260	S/W Lab - I (Based on Distributed Operating System)		5	80	32	20	8	100
MT-270	S/W Lab - II (Based on Advanced Data Base Management System)		5	80	32	20	8	100
MT-280	Seminar					50	20	50
						Total Marks		750

Elective Papers

MT-250 (i) Security of Information System

MT-250 (ii) System Simulation

MT-250 (iii) Mobile and Wireless Communications

MT-210 DISTRIBUTED OPERATING SYSTEM

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.
Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit

Unit 1

Operating system, types of O.S., Distributed Computing System, Evolution of Distributed Operating System, Distributed Commuting System Models, Distributed Operating System, Issues in designing a Distributed Operating System.

Desirable Features of a message passing system, Synchronization, Buffering, Multidatagram messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group Communication.

Unit 2

The RPC Model, Transparency of RPC, Stub generation, RPC Messages, Marshaling Arguments and Results, Server Management, Parameter, Passing Semantics, Call Semantics, Communication Protocols for RPCs, Complicated RPCs, Client Server Binding, Exception Handling, Security.

General Architecture of DSM Systems, Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Trashing.

Unit 3

Clock Synchronization, Event Ordering, Mutual Exclusion, Deadlock, Election

Algorithms.

Features of a global scheduling algorithm, Task assignment Approach, Load Balancing Approach, Load Sharing Approach.

Unit 4

Process Migration, threads.

File models, File Accessing Models, File Sharing Semantics, File Caching Schemes, File Replication, Fault Tolerance.Naming, Security

References:

1. " Distributed Operating System Concept and Design", Pradeep K. Sinha, PHI
2. " Distributed Operating System" Andrew S. Tananbaum, Pearson Education Asia.

MT-220 ADVANCED DBMS

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.

Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit

Unit 1: Introduction: DBMS Architecture and Components, Advantages and Disadvantages; Data models: ER, EER, Network, Hierarchical and Relational data models; Normalization and de-normalization.

Query Processing: General strategies for query processing, query processor, syntax analyzer, Query decomposition, Heuristic Query optimization, Cost estimation.

Unit 2: Transactions, Concurrency control and Recovery: Transaction concept, Anomalies due to interleaved executions, schedules, precedence graph method for serializability, Lock thrashing, phantom problem; Concurrency control protocols: locking schemes, optimistic scheduling, multiversion techniques; reflecting updates: logging schemes and checkpoints.

Unit 3: Object Oriented Database Development: Basic concepts, Object oriented data model, ER Vs OODM, Characteristics, advantages and disadvantages of OODBMSs, Object definition language, Object query language.

Object Relational Databases: Introduction, Basic concepts, History, ORDBMS query language: enhanced SQL (SQL3), advantages and disadvantages of ORDBMS, Challenges of ORDBMS, and Comparison with OODBMS.

Unit 4: Parallel and Distributed Databases: Basic concepts, architectures, parallelization of operations, Methods for data distribution: fragmentation and replication, catalog management, Distributed query processing: semi,joins and bloom,joins.

Databases for Advanced Applications: Data warehousing systems, Data warehouse Vs DBMS, architecture, Data mining systems, KDD process, temporal database concepts, spatial databases, multimedia databases, Web databases, Information retrieval and XML.

References:

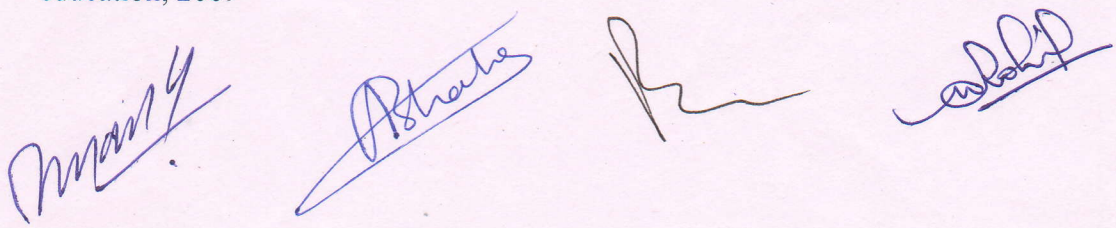
1. An Introduction to database systems by Bipin C. Dcsai, Galgolia Publications.

2. Modern Database Management by Feffray A. lioffcr, Mary B. Prcscotl, Fred R Mcfaddcn, 6th edition. 1..1MI Pcarson Education.
3. Principles of distributed database systems, by M. Tamer & Valduricz, 2" edition, LPE Pearson education.

4. Database system concepts by Korth, Silberchatz, Sudarshan, McGraw Hills

5. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems [3e], McGraw,Hill

6. Database systems:concepts, design and applications by S.K. Singh, Pearson education, 2009



MT-230 KNOWLEDGE & DISCOVERY MANAGEMENT

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.

Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit

Unit 1

Introduction: What is knowledge, the knowledge edge, Completing chain from Data, Information to knowledge., the technology push for knowledge management , Demystifying Knowledge management.

The Technology Prospective: Knowledge Management Techniques, IS & IT are not quite synonymous, Transformation Model Technologies, AI & Expert System, Networking, Web Publishing, Search Engine & Text Mining, Document Management, Work Flow, Dissemination Technologies, KBMS

Unit 2

Convergence of Technologies

What is convergence of Technologies, Chaos & Attractors or Factors Responsible for present development.

Revisiting Some Technologies used in knowledge management: Data mining and the data warehouse, the knowledge discovery process, Setting up a KDD environment, Knowledge Representation Issues, Web Technology & internet specific for knowledge management.

Unit3

Implementing Knowledge Management

The Ten,steps Kn Road Map, Infrastructural Evoluation & Leverage evaluation, Knowledge Management System Analysis & Design, KMS Development, Review & Measuring ROI (Return of Investment)

Implementation KM in your organization: Re,emphasised a lining or lining knowledge strategy to Business Strategy, The K,gap analyzer as a tool, the four phase Knowledge methodology, creating the knowledge organization

Unit,4

Changing Lives Every Where : E,Governance, the Knowledge Management way, Smart schools, Virtual University, Building knowledge societies

Text Books:

i) The knowledge Management Toolkitby Amrit Tiwana Pearson Education Asia,k (200)

ii) Knowledge Management, Enabling Business Growth by Ganesh Natrajan & Sandhya Shekhar, Tata McGrawHill(200)

iii) Data Mining by Pieter Adriaans & Dolf Zantinge, Pearson Education Asia (1999, reprint2000)

MT-240 COMPILER CONSTRUCTION

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.

Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit

Unit 1

Compilers and Translators, Lexical analysis, Syntax analysis, Intermediate code generation, Optimization, Code generation. Error, lexical phase errors, synthetic phase errors, semantic errors.

UNIT – II

Lexical Analysis: Process of lexical analysis, finite state automata, DFA and NFA, recognition of regular expressions, LEX.

Formal grammars and their application to syntax analysis, BNF notation, ambiguity, YACC. The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG.

UNIT – III

Parsing Techniques: top down & bottom-up parsing, Shift reduce parsing, operator precedence parsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR(0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables, constructing LALR sets of items.

UNIT – IV

Intermediate Code Generation: Issues in the design of a code generator, Intermediate languages, generating intermediate code for declarative statement, assignment statement, Boolean expression, and case statement.

Code Optimization: potential cases of code optimization, optimization of basic blocks, loops in flow graphs, code improving transformation.

References:

1. Affred V. Aho and Jaffrey D . Ullman, "Principles of Compiler Design", Narosa Publication.
2. Ravi Sethi, " Compiler, Principles, Techniques and Tools", Pearson Education Asia.

MT-250 (i) SECURITY OF INFORMATION SYSTEMS

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.
Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit

Unit,1 Basic Encryption and Decryption:
Introduction to Ciphers, Monoalphabetic Substitutions such as the Caesar Cipher, Cryptanalysis of Monoalphabetic Ciphers, Polyalphabetic Ciphers such as Vigenere Tableaux, Cryptanalysis of Polyalphabetic Ciphers, Perfect Substitution Cipher such as the Vernam Cipher, Stream and Block Ciphers..

Unit,2 Properties of Arithmetic Operations:
Inverses, Primes, Greatest Common Divisor, Euclidean Algorithm, Modular Arithmetic, Properties of Modular Arithmetic, Computing the inverse, Fermat's Theorem, Algorithm for Computing Inverses, Random number generation.

Secure Secret Key (Symmetric) Systems: Data Encryption Standard (DES), Analyzing and Strengthening of DES, Advance Encryption Standard (AES)

Public Key (Asymmetric key) Encryption Systems: Concept of Public key Encryption System, Introduction to Merkle,Hellman Knapsacks, Rivest,Shamir,Adelman (RSA) Encryption, Digital Signature Algorithms (DSA)

Hash Algorithms: Hash Concept, Description of Hash Algorithms , Message Digest Algorithms such as MD4 and MD5 , Secure Hash Algorithms(SHA) .

Unit–3 Applied Cryptography, Protocols and Practice:
Key Management Protocols: Diffie,Hellman Algorithm, Key Exchange with Public Key Cryptography. **Public Key Infrastructure (PKI):** Concept of Digital Certificate, Certificate Authorities and it's roles, X509 Structure of Digital Certificate.

Unit,4 Network Security Practice:
Authentication Applications, Kerberos, X.509

Authentication Service; Electronic Mail Security, Pretty Good Privacy, S/MIME;

IP Security: IP Security Overview,IP Security Architecture, Authentication

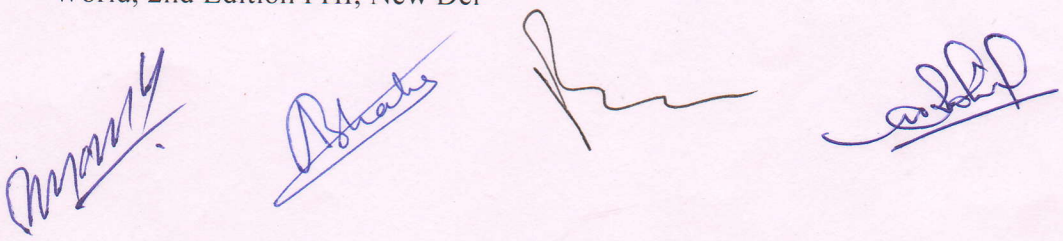
Header, Encapsulating Security Payload, Combining Security Associations;

Web

Security: Web Security Considerations, Secure Sockets Layer and Transport Lay er Security, Secure Electronic Transaction

Reference Books:

1. William Stalling, Cryptography and Network Security, 3rd Edition. PHI New Delhi
2. William Stalling, Network Security Essentials, 2nd Edition. PHI New Delhi
3. Charlie Kaufman, Network Security: Private Communication in Public World, 2nd Edition PHI, New Del



MT-250 (ii) System Simulation

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.

Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four MORE questions selecting one question from each Unit

Unit 1

System concepts: System approach to problem solving, Characteristics of Systems, State of the system, System boundaries and environment.

Modeling and Simulation: Need of studying models, Type of Models. Principles and Nature of Computer Modeling and Simulation, When to use simulation, Limitation of Simulation.

Simulation Concepts : Concepts of Continuous / Discrete System simulations with the help of examples, Numerical Integration vs. Continuous Simulation, Analog vs. Digital Simulation, and Hybrid Simulation.

Unit II

Generation of Random Numbers: Generation of uniformly / non-uniformly distributed, Pseudo random numbers, Monte Carlo Computation vs. Stochastic Simulation.

Case Studies : Simulation of Pure Pursuit Problem, Chemical reactor; Servo System, and Water Reservoir System.

Unit III

Design of Simulation Experiments: Run length of Static/ Dynamic Simulation Experiments, Variance Reduction Techniques, and Validation.

Simulation of Queuing System : Rudiments of queuing theory, Simulation of Single Server, Two Server and M-Server Queuing Systems.

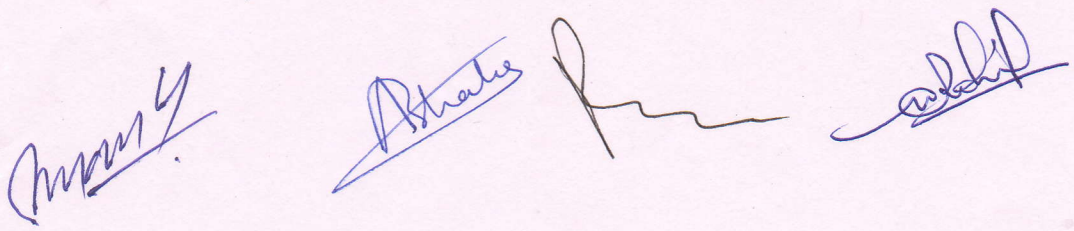
Unit IV

Simulation in Inventory Control and Forecasting : Elements of Inventory theory, Generation of Poisson and Erlang Variants, Use of Forecasting and Regression analysis in simulation.

Simulation Languages: Continuous Simulation Languages- Block Structured Continuous Simulation Languages, Expression Based Languages; Discrete Simulation Languages - SIMSCRIPT, GPSS, SIMULA; Factors in selection of Discrete Simulation Languages.

Text Books:

1. Gordon, "System Simulation", PHI.
2. Deo, Narmsimha, "System Simulation for Digital Computers", PHI



MT-250 (iii) MOBILE AND WIRELESS COMMUNICATION

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 24 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 14 marks.

Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit

Unit 1 Introduction

Applications, history, market, reference model and overview. Wireless Transmission— Frequencies, signals, antennas, signal propagation, multiplexing, modulation, spread spectrum, cellular system

Unit 2 MAC and Telecommunication system:

Specialized MAC, SDMA, FDMA, TDMA, fixed TDM, classical ALOHA, slotted, ALOHA, CSMA, DAMA, PKMA, reservation TDMA. Collision avoidance, polling inhibit sense multiple access.('DM A, comparison, CSM, mobile services, architecture radio interlace, protocol, localization, calling, handover, security, new data services, Introduction to W'LL.

Satellite and Broadcast Systems:

History, Applications, GLO, LLO, MLO, routing, localization , handover in satellite system. Digital audio and video broadcasting.

Wireless LAN:

IEEE 802.11,System and protocol architecture, physical layer. MAC layered management. Bluetooth,,, User scenarios, physical layer, MAC layer, networking, security and link management.

Unit 3 Mobile network Layer:

Mobile IP, goals, assumption, requirement, entities, terminology, IP packet

SCHEME OF EXAMINATION FOR M.TECH. COMPUTER ENGINEERRING

Paper Code	Nomenclature	Time	Lectures/ Week	External Marks		Internal Marks		Total
				Max.	Pass	Max.	Pass	
Third Semester								
MT-310	Research Methodology and Tools	3 HRS	5	80	32	20	8	100
MT-320	Data Analytics	3HRS	5	80	32	20	8	100
MT-330	Semantic Web and Social Networks	3 HRS	5	80	32	20	8	100
MT-340	Elective I	3 HRS	5	80	32	20	8	100
MT-350	Elective II	3 HRS	5	80	32	20	8	100
MT-360	Software Lab I – Based on MT-310	3 HRS	5	80	32	20	8	100
MT-370	Software Lab I – Based on MT-320	3 HRS	5	80	32	20	8	100
MT-380	Seminar					50	20	50
						Total Marks		750

Elective I	Elective II
i. Cloud Computing	i. Aspect Oriented Software Engineering
ii. Ad-hoc Networks	ii. Artificial Intelligence and Neural Networks

Fourth Semester							
Paper Code	Nomenclature	Time	External Marks		Internal Marks		Total
			Max.	Pass	Max.	Pass	
MT-410	DISSERTATION	EVALUATION	100	40	50	20	150
		VIVA-VOCE	100	40	-	-	100
					Total		250
					Grand Total		2500

MT-310 RESEARCH METHODOLOGY AND TOOLS

Maximum marks: 100 External: 80
Internal: 20
Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Foundations of Research: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method, Understanding the language of research, Concept, Construct, Definition, Variable. Research Process. Problem Identification & Formulation: Research Question, Investigation Question, Measurement Issues, Hypothesis, Qualities of a good Hypothesis, Null Hypothesis & Alternative, Research Design: Concept and Importance in Research, Features of a good research design , Exploratory Research Design: Concept, types and uses, Descriptive Research Designs: concept, types and uses. Experimental Design: Concept of Independent & Dependent variables. Qualitative and Quantitative Research: Qualitative research, Quantitative research, Concept of measurement, causality, generalization, replication. Merging the two approaches.

UNIT – II

Measurement: Concept of measurement, Problems in measurement in research ,Validity and Reliability. Levels of measurement, Nominal, Ordinal, Interval, Ratio. Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, Ethical issues related to publishing, Plagiarism and Self Plagiarism. Thesis Writing: Writing , introduction, review of literature, results, abstract, summary, synopsis, Reference citing and listing.

UNIT –III

Fundamental Terms: Attributes and Target Attributes, Concepts and Examples, Attribute Roles, Value Types, Data and Meta Data ,Modelling, Installation and First Repository :Perspectives and Views, Design Perspective, Operators and Repositories View, Process View, Operators and Processes , Further Options of the Process View, Parameters View ,Help and Comment View, Overview View ,Problems and Log View Design of Analysis Processes : Creating a New Process, Repository Actions ,The First Analysis Process, Transforming Meta Data ,Executing Processes ,Looking at Results , Breakpoints.

UNIT-IV

Data and Result Visualization: Sources for Displaying Results; About Data Copies and Views; Display Formats: Description, Tables, Charts, Graphs, Special Views; Result Overview.
The RapidMiner Studio Repository: Creating a New Repository, Using the Repository: Processes and Relative Repository Descriptions, Importing Data and Objects into the Repository, Access to and Administration of the Repository, The Process Context; Data and Meta Data: Propagating Meta Data from the Repository and through the Process.

Text Books:

1. Donald Cooper & Pamela Schindler, Business Research Methods, McGraw Hill.
2. Alan Bryman & Emma Bell, Business Research Methods, Oxford University Press.
3. Kothari C. K. (2004) Research Methodology- Methods and Techniques (New Age International, New Delhi) 2nd Ed.

Reference Books:

1. N. Gurumani, Scientific Thesis Writing and Paper Presentation, MJP Publishers.
2. Montgomery, Douglas C., Design and Analysis of Experiments, Wiley India Pvt. Ltd.

MT-320 DATA ANALYTICS

Maximum marks: 100
Time: 3 hours

External: 80
internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction: Need of Big Data, Big Data vs. conventional data, Big Data Platform, Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.
Introduction to Data Science & Analytics, Business value of Analytics and Data Science, Typical Problems solved with data science, Analytics Modeling, Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools.

UNIT – II

Data Analysis: Regression Modeling - Multivariate Analysis - Bayesian Modeling - Inference and Bayesian Networks - Support Vector and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics - Rule Induction, Confidence Interval and Tests of Significance, Inferential statistics and predictive analytics, Chi square, Test of independence, ANOVA.

UNIT – III

Frameworks and Visualization: MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - Casandra - Hadoop Distributed File Systems – Visualizations - Visual Data Analysis Techniques - Interaction Techniques;
Systems and Analytics Applications - Analytics using Statistical packages -Approaches to modeling in Analytics – correlation, regression, decision trees, classification, association- Intelligence from unstructured information-Text analytics.

UNIT – IV

NoSQL Database concepts, Schema, Two Phase Commit, Sharding & Share Nothing Architecture, Feature Based, Key Based, Lookup Table Based, Cassandra Definition & Features, Distributed & Decentralized, Elastic Scalability, High Availability & Fault Tolerance, Tuneable Consistency, Strict & Casual Consistency, Column Orientation, Schema Free, High Performance.
Creating Keyspace and Column Family, Writing and Reading Data, Cluster, Wide Rows, Skinny Rows, Referential Integrity, Secondary Indexes, Sorting, DeNormalisation, Design Patterns, Materialized Views. CQL-Data Definition language(DDL) Statements, Data Manipulation Language (DML), Create and modify Users, User permission, Capture CQL output to a file, Import and export data, CQL scripts from within CQL, CQL Scripts from the command prompt.

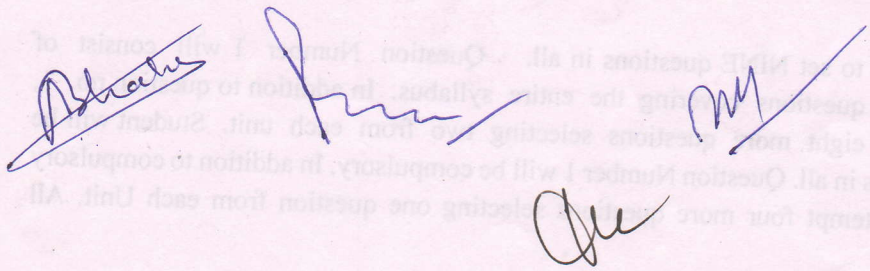
Text Books:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", Wiley India Pvt. Ltd.

Reference Books:

1. Glenn J. Myatt, "Making Sense of Data", Wiley India Pvt. Ltd.
2. Akerker, "Big Data Computing", CRC Press.
3. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier

India, Reprinted 2008.
7. Big Data for Dummies by Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Elsevier India.
8. Python for Data Analysis by Wes McKinney
9. Statistics S. C. Gupta.



MT-330 SEMANTIC WEB AND SOCIAL NETWORKING

External: 80
Maximum marks: 100 Internal: 20
Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Web Intelligence Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners Lee www, Semantic Road Map, Logic on the semantic Web.

Knowledge Representation for the Semantic Web Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web

UNIT – II

Resource Description Framework (RDF) / RDF Schema, Ontology Web Language (OWL), UML, XML/XML Schema.

Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT – III

Semantic Web Applications, Services and Technology Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWLS Ontology for Web Services,

Semantic Search Technology, Web Search Agents and Semantic Methods.

UNIT - IV

Social Network Analysis and semantic web: What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis

Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

Text Books:

1. Berners Lee, Godel and Turing, Thinking on the Web Wiley India Pvt. Ltd.
2. Peter Mika, Social Networks and the Semantic Web, Springer, 2007.

Reference Books:

1. J. Davies, R. Studer, P. Warren, Semantic Web Technologies, Trends and Research in Ontology Based Systems, Wiley India Pvt. Ltd.
2. Liyang Lu, Semantic Web and Semantic Web Services, Chapman and Hall/CRC Publishers, (Taylor & Francis Group)
3. Frank Van Harmelen, Information Sharing on the semantic Web Heiner Stucken schmidt; Springer Publications.
4. T. Segaran, C. Evans, J. Taylor, Programming the Semantic Web, O'Reilly, SPD.

MT -340 (I) - CLOUD COMPUTING

Maximum marks: 100 External: 80
Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Cloud Computing: Definition, roots of clouds, characteristics, Cloud Architecture – public, private, hybrid, community, advantages & disadvantages of Cloud Computing.
Migrating into a Cloud: broad approaches, seven-step model to migrate
Virtualization: benefits & drawbacks of virtualization, virtualization types – operating system virtualization, platform virtualization, storage virtualization, network virtualization, application virtualization, virtualization technologies.

UNIT – II

Cloud Services & Platforms: Compute services, Storage services Database services, Application Services, Queuing services, E-mail services, Notification services, Media services, Content delivery services, Analytics services, Deployment & management services, Identity & access management services. Case studies of these services.
Federated & Multimedia Cloud Computing: architecture, features of federation types, federation scenarios, layers enhancement of federation; Multimedia Cloud.

UNIT – III

SLA Management in Cloud Computing: traditional approaches to SLA management, types of SLA, lifecycle of SLA, SLA management in cloud, automated policy-based management.
Cloud Security: challenges, CSA cloud security architecture, authentication, authorization, identity & access management, data security, auditing.
Legal Issues in Cloud Computing: data privacy and security issues, cloud contracting models.

UNIT – IV

Developing for Cloud: Design considerations for cloud applications, reference architectures for cloud applications, cloud application design methodologies, data storage approaches
Python for Cloud: Python characteristics, data types & data structures, control flows, functions, modules, packages, file handling, date/time operations, classes, Python web application framework – Django.

Text Books

1. Arshdeep Bahga, Vijay Madisetti, Cloud Computing – A Hands-on Approach, University Press, 2014
2. Saurabh Kumar, Cloud Computing, 2nd Edition, Wiley India Pvt Ltd.
3. Rajkumar Buyya, James Broberg, Andrzej Goscinski, Cloud Computing – Principles and Paradigms, Wiley India Pvt. Ltd.

Reference Books

1. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd.
2. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing.
3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pvt Limited, July 2008.

MT-340 (II) - ADHOC NETWORKS

Maximum marks: 100 External: 80
Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction, Issues in Ad-Hoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

Ad-Hoc Network Routing & TCP - Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc – Feedback based, TCP with explicit link, TCP-Bus, Ad Hoc TCP, and Split TCP.

UNIT -II

Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.
Issues in WSN routing – OLSR, AODV. Localization – Indoor and Sensor Network Localization.

UNIT III

QoS in WSN: Real-time traffic support – Issues and challenges in providing QoS – Classification of QoS Solutions – MAC layer classifications – QoS Aware Routing Protocols – Ticket based and Predictive location based Qos Routing Protocols.

Need for Energy Management – Classification of Energy Management Schemes – Battery Management and Transmission Power Management Schemes – Network Layer and Data Link Layer Solutions – System power Management schemes

UNIT IV

Mesh Networks: Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture – Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks.

Text Books

1. C.Siva Ram Murthy and B.Smanoj, "Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2004.
2. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004.

Reference Books

1. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.
2. Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O'Reilly Publishers, 2007.

MT -350(I) - ASPECT ORIENTED SOFTWARE ENGINEERING

Maximum marks: 100 External: 80
Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Engineering Aspect-Oriented Systems, Aspect-Orientation in the Software Lifecycle: Fact and Fiction, Generic Aspect-Oriented Design with Theme/UML, Expressing Aspects Using UML Behavioral and Structural Diagrams, Concern Modeling for Aspect-Oriented Software Development.

UNIT – II

Design Recommendations for Concern Elaboration Tools, An Initial Assessment of Aspect-Oriented Programming, Aspect-Oriented Dependency Management, Developing Software Components with Aspects: Some Issues and Experiences, Smartweaver: A Knowledge-Driven Approach for Aspect Composition.

UNIT – III

Introduction, LANGUAGES AND FOUNDATIONS, Aspect-Oriented concepts: Aspects, join points, and pointcuts, N-Degrees of Separation: Multi-Dimensional Separation of Concerns.
Principles and Design Rationale of Composition Filters, AOP: A Historical Perspective.

UNIT – IV

Introduction to AspectJ , Coupling Aspect-Oriented and Adaptive Programming, Untangling Crosscutting Models, Trace-Based Aspects, Improving Modularity, Separating Concerns with First-Class Namespaces.

Text Books

1. Robert E. Filman Addison-Wesley, 2005 - Aspect Oriented Software Development.
2. Ivar Jacobson, Pan-Wei Ng Addison-Wesley, 2005 Aspect-oriented Software Development with Use Cases

Reference Books

1. Ramnivas Laddad, Manning Publications Co. Greenwich, CT, USA ©2003 -AspectJ in Action: Practical Aspect-Oriented Programming.
2. Ivan Kiselev Indianapolis, Ind. : Sams, 2002.-Aspect-oriented Programming with AspectJ

MT-350 (II) - ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS

Maximum marks: 100 External: 80
Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT-I

Nature and goals of AI. Application areas.

Searching state-spaces: Use of states and transitions to model problems. Hill Climbing, Simulation annealing, A* and AO* search algorithm.

Reasoning in logic: Brief revision of propositional and predicate logic. Different characterizations of reasoning. Generalized modus ponens. Resolution.

UNIT-II

Forward and backward chaining. Knowledge Representation, Diversity of knowledge. Inheritance hierarchies. Semantic networks. Knowledgebase ontologies. Handling uncertainty, Diversity of uncertainty. Inconsistency. Dempster -Shafer theory.

Machine Learning: Induction of knowledge. Decision tree learning algorithms. Intelligent agents, An architecture for intelligent agents. Argumentation. Decision-making.

UNIT-III

Nature and Goals of Neural Computing: Comparison with rule-based AI. Overview of network architectures and learning paradigms. Binary Decision Neurons, The McCullough-Pitts model. Single-layer perceptrons and their limitations. The Multilayer Perceptron, The sigmoid output function. Hidden units and feature detectors. Training by error backpropagation. The error surface and local minima. Generalisation, how to avoid 'overtraining'.

UNIT-IV

The Hopfield Model: Content addressable memories and attractor nets. Hopfield energy function. Setting the weights. Storage capacity.

Self-Organizing Nets: Topographic maps in the brain. The Kohonen self-organizing feature map.

Text Books

1. Beale R., & Jackson, T. (1990). *Neural Computing-an introduction*. CRC Press.
2. Russell S., Norvig P., A modern approach. *Artificial Intelligence. Prentice-Hall, Egnlewood Cliffs.*

Reference Books

1. Patterson D. (1990). *Introduction to artificial intelligence and expert systems*. Prentice-Hall, Inc.
2. Nilsson N. J. (1998). *Artificial intelligence: a new synthesis*. Morgan Kaufmann.