Department of Computer Science &Applications
Chaudhary Devi Lal University, Sirsa (Haryana)
Scheme & Syllabi of Examination for
Master of Technology in Computer Science & Engineering
(M. Tech. CSE Week End)
under Choice Based Credit System

SEMESTER-I	L/T	P	Credit	Int	Ext	Total
MT-PT-11 Advanced Computer Architecture	4	-	4	30	70	100
MT-PT-12 Advanced Database Systems	4	-	4	30	70	100
MT-PT-13 Lab-I (Based on MT-PT-12)	-	4	2	20	30	50
MT-PT-14 Seminar	2	-	2	50	-	50
	Total		12	130	170	300

SEMESTER-II	L/T	P	Credit	Int	Ext	Total
MT-PT-21 Big Data Analytics	4	-	4	30	70	100
MT-PT-22 Advanced Operating Systems	4	-	4	30	70	100
MT-PT-23 Lab-II (Based on MT-PT-22)	-	4	2	20	30	50
MT-PT-24 Seminar	2	-	2	50	-	50
	Total		12	130	170	300

SEMESTER-III	L/T	P	Credit	Int	Ext	Total
MT-PT-31 Advanced Software Engineering	4	-	4	30	70	100
MT-PT-32 Advanced Data Structures	4	-	4	30	70	100
MT-PT-33 Lab-III (Based on MT-PT-32)	-	4	2	20	30	50
MT-PT-34 Seminar	2	-	2	50	-	50
	Total		12	130	170	300

SEMESTER-IV	L/T	P	Credit	Int	Ext	Total
MT-PT-41 Simulation and Modeling	4	-	4	30	70	100
MT-PT-42 Elective	4	-	4	30	70	100
MT-PT-43 Lab-IV (Based on MT-PT-41)	-	4	2	20	30	50
MT-PT-44 Seminar	2	-	2	50	-	50
	Total		12	130	170	300

List of elective subjects for MT-PT-42
(i) Advanced Computer Networks
(ii) Advanced Microprocessors
(iii) Soft computing

SEMESTER-V	L/T	P	Credit	Int	Ext	Total
MT-PT-51 Research Methodology	4	-	4	30	70	100
MT-PT-52 Elective	4	-	4	30	70	100
MT-PT-53 Lab-V (Based on MT-PT-51)	-	4	2	20	30	50
MT-PT-54 Seminar	2	-	2	50	-	50
	Total		12	130	170	300

4/7/2017

4/7/17

List of elective subjects for MT-PT-52

(i) Advanced Artificial Intelligence
(ii) Advanced Digital Image Processing
(iii) Advanced Compiler Design

SEMESTER-VI	L/T	P	Credit	Int	Ext	Total
MT-PT-61 Dissertation	2	-	12	75	225	300

4/7/2017

4/7/17

MT-PT-11 Advanced Computer Architecture

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Computational model, The concept of Computer Architecture, Introduction to Parallel Processing

Unit-II

Introduction to ILP Processors, Pipelined Processors, VLIW Architecture, Super Scalar Processors

Unit-III

Processing of Control transfer instruction, Code Scheduling for ILP-processors, Introduction to Data Parallel Architecture, SIMD Architecture, MIMD Architecture

Unit-IV

Vector Architecture, Multi threaded Architecture, Distributed Memory MIMD Architecture, Shared memory MIMD Architecture.

Reference:

1. DezsoSima, Terence Fountani, Peter Kacsuie, "Advanced Computer Architectures: A Design Space Approach, 1/e, Pearson Education.
2. Computer Architecture by Stone

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MT-PT-12 Advanced Database Systems

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Introduction of DBMS, types of DBMS and their advantages and disadvantages
Introduction of RDBMS, types of relational query language, Normalization, Query optimization
Database protection in RDBMS –Integrity, Concurrency control, Recovery

Unit-II

Distributed Databases: concepts, structure, trade-offs
Methods of data distribution –fragmentation, replication, design & advance concepts of DDBMS
Introduction to object oriented databases, deductive databases

Unit-III

Data warehousing Concepts: Architecture, Dataflows, Tools & Technologies, Data Marts, Data Mining & Online Analytical Processing

Unit-IV

Spatial & Multimedia databases, Mobile Computing & Mobile Databases

References:

1) Elmasri. Navathe, "Fundamentals of Database Systems", Pearson Education.
2) Henry F. Korth, A Silberschatz, "Database Concepts", Tata McGraw Hill.
3) Thomas Conolly, Carolyn Begg," Database Systems", Pearson Education.
4) Alexis Leon, Mathews Leon, "Database Management Systems".
5) C.J.Date ,"An Introduction to DBMS", Narosa Publishing House.

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MT-PT-21 Big Data Analytics

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT I

Introduction to Big Data, Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce. Matrix-Vector Multiplication by Map Reduce. Introduction of HADOOP ,Big Data – Apache Hadoop&HadoopEcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.

UNIT- II

HADOOP ARCHITECTURE - Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode. HadoopMapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH &Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

UNIT III

BIG DATA PRIVACY, ETHICS AND SECURITY - Privacy – Reidentification of Anonymous People – Why Big Data Privacy is self regulating? , Ethics – Ownership – Ethical Guidelines – Big Data Security – Organizational Security

UNIT IV

SECURITY, COMPLIANCE, AUDITING, AND PROTECTION- Steps to secure big data – Classifying Data – Protecting – Big Data Compliance – Intellectual Property Challenge – Research Questions in Cloud Security – Open Problems, HADOOP SECURITY DESIGN Kerberos - Default Hadoop Model without security - Hadoop Kerberos Security Implementation & Configuration, DATA SECURITY & EVENT LOGGING Integrating Hadoop with Enterprise Security Systems - Securing Sensitive Data in Hadoop – SIEM system – Setting up audit logging in hadoop cluster.

REFERENCES:

1. Mark Van Rijmenam, "Think Bigger: Developing a Successful Big Data Strategy for Your Business", Amazon, 1 edition, 2014.
2. Frank Ohlhorst John Wiley & Sons, "Big Data Analytics: Turning Big Data into Big Money", John Wiley & Sons, 2013.
3. Sherif Sakr, "Large Scale and Big Data: Processing and Management", CRC Press, 2014.
4. Sudeesh Narayanan, "Securing Hadoop", Packt Publishing, 2013.
5. Ben Spivey, Joey Echeverria, "Hadoop Security Protecting Your Big Data Problem", O'Reilly Media, 2015.
6. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
7. Chris Eaton, Dirk deroos et al. , "Understanding Big data ", McGraw Hill, 2012. 3. Tom White. "HADOOP: The definitive Guide" , O Reilly 2012

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MT-PT-22 Advanced Operating Systems

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note: Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

Security and Protection: Security Threats, Attacks on Security, Security Violation through Parameters, Computer Worms, Computer Viruses, Security Design Principles, Authentication, Protection Mechanism, Encryption, Security in Distributed Environment. Graphical User Interface and the Operating System: Windowing Technology, Graphical User Interface, relationship between Operating System and the Windows, Components of GUI, requirement of a Windows based GUI

Unit-II

Distributed and Parallel Processing: Parallel Processing, Distributed Processing, Difference between Distributed and Parallel Processing, Advantages of Parallel Processing, Writing Programs for Parallel Processing, Machine Architecture supporting Parallel Processing, Operating System for Parallel Processors, Issues in Operating System in Parallel Processing.

Unit-III

Distributed Operating Systems: Architecture of Distributed Systems, Networking, Interprocess Communication Protocols, Distributed Computation Paradigm, Network Operating System, Design issues in Distributed Operating System, Theoretical issues in Distributed Systems, Distributed Control Algorithms, Distributed Mutual Exclusion, Distributed Deadlock Handling, Distributed Scheduling Algorithms, Recovery and Fault Tolerance.Distributed File System, Distributed system Security.

Unit-IV

Disk Performance Optimization; Moving Head Disk Storage, Disk Scheduling. Seek Optimization, Rotational Optimization, Disk Caching.

Processes: Process Model, Implementation of Processes, Threads, Inter-process Communication, Race Condition, Critical Section, Mutual Exclusion with Busy waiting, Sleep and Wakeup, Semaphores, Monitors, Message Passing. Classical IPC Problems, Process Scheduling, Round Robin, Priority, Multiple Queues, Shortest Job First, Guaranteed, Lottery, Real Time and Two Level Scheduling.

References:

1. Operating Systems; Achyut S Godbole; Tata McGraw Hill Publishing Company Limited, New Delhi.
2. Operating Systems; A Concept based Approach; D. M. Dhamdhere; Tata McGraw Hill Publishing Company Limited, New Delhi..
3. Operating Systems-2nd Edition; H. M. Deitel; Pearson Education.
4. Operating Systems-Design and Implementation; Andrew S. Tanenbaum, Albert S. Woodhull; Prentice-Hall of India Private Limited, New Delhi.

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Quality in software requirements.

MT-PT-31 ADVANCED SOFTWARE ENGINEERING

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT I.

Life cycle models,
Requirement analysis and specification,
Formal requirements specification,
Quality in software requirements.
Software architecture.

UNIT II.

Fundamental issues in software design, goodness of design, cohesions, coupling,
Function-oriented design.
Structured analysis and design.
Overview of object –oriented concepts.
Aspect oriented programming

UNIT III.

Unified Modeling Language, unified design process,
User interface design, coding standards and guidelines,
Code walkthrough, formal methods and reviews,
Unit testing, black box and white box testing, integration and system testing.

UNIT IV.

Software quality and reliability.
SEI CMM, ISO 9001 and Six Sigma, clean room testing technique.
Software maintenance issues and techniques, versioning, refactoring, reverse engineering.
Software reuse, Client-Server software development.

Reference:

1. Ian Sommerville, Software Engineering, Addison Wesley.
2. Pressman Roger, Software Engineering –A Practitioner's Approach, Tata McGraw Hill.
3. Richard Fairley, Software Engineeering Concepts,Tata Mcgraw Hill.
4. Pankaj Jalote, An Integrated Approach to Software engineering, Narosa Publication.

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MT-PT-32– ADVANCED DATA STRUCTURES

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT I

Iterative Algorithms: Measures of Progress and Loop Invariants; Paradigm Shift: Sequence of Actions versus Sequence of Assertions; Steps to Develop an Iterative Algorithm; Different Types of Iterative Algorithms; Recursion-Forward versus Backward; Proving Correctness with Strong Induction; Examples of Recursive Algorithms. Ackermann's Function; Recursion on Trees-Tree Traversals; Heap Sort and Priority Queues; Representing Expressions.

UNIT II

Optimization Problems; Graph Search Algorithms; Generic Search; Breadth-First Search;Dijkstra's Shortest-Weighted-Path ;Depth-First Search;Recursive Depth-First Search;Linear Ordering of a Partial Order; Network Flows and Linear Programming;Hill Climbing;Primal Dual Hill ClimbingSteepest Ascent Hill Climbing;Linear Programming;Recursive Backtracking;Developing Recursive Backtracking Algorithm; Pruning Branches:Satisfiability

UNIT III

Developing a Dynamic Programming Algorithm-Subtle Points; Question for the Little BirdSubinstances and Subsolutions;Set of Substances;Decreasing Time and Space;Number of Solutions;Code. Reductions and NP - Completeness – Satisfiability; Proving NP-Completeness; 3-Coloring; Bipartite Matching. Randomized Algorithms; Randomness to Hide Worst CasesOptimization Problems with a Random Structure.

UNIT IV

Practice-Linked Lists;The Role of Locking;List-Based Sets;Concurrent Reasoning; CoarseGrained Synchronization;Fine-Grained Synchronization;Optimistic Synchronization; Lazy Synchronization;Non-Blocking Synchronization;Concurrent Queues and the ABA ProblemQueues;A Bounded Partial Queue;An Unbounded Total Queue;An Unbounded Lock-Free QueueMemory Reclamation and the ABA Problem; Dual Data Structures; Concurrent Stacks and Elimination; An Unbounded Lock-Free Stack; Elimination;The Elimination Backoff Stack.

REFERENCES:

1. Jeff Edmonds, "How to Think about Algorithms", Cambridge University Press, 2008.
2. Steven S. Skiena, "The Algorithm Design Manual", Springer, 2008.
3. Peter Brass, "Advanced Data Structures", Cambridge University Press, 2008.
4. S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani, "Algorithms" , McGrawHill, 2008.
5. V. Aho, J. E. Hopcroft, and J. D. Ullman, "The Design and Analysis of Computer Algorithms", Addison-Wesley.

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MT-PT-41 SIMULATION AND MODELING

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition, more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT I.

Introduction: Concept of System, stochastic activities, continuous and discrete systems, system modeling, principal used in modeling.
Simulation: Concept of simulation, steps in simulation experiment Benefits of simulation and its pitfalls. Generation of random numbers, Generation of non-uniformly distributed random numbers.

UNIT II.

Simulation of discrete system simulation continuous system with illustrative simulation examples.
Queuing Systems: Basic concept of queuing theory. Simulation of single server, two server and general queuing systems.

UNIT III.

Simulation Of Inventory Control And Forecasting: Elements of inventory theory, inventory models, Generation of Poisson and Erlang variates, forecasting and aggression analysis.
Design And Evaluation Of Simulation Experiments: Experiment layout and validation.

UNIT IV.

Simulation Languages: Continuous and discrete simulation languages, Block Structured continuous simulation languages, Expression based languages, Discrete system simulation languages.
Introduction to GPSS, SIMCRIPT, and SIMULA.
Factors in selection of discrete system simulation languages.

References:

1. Narsing Deo, System Simulation with Digital Computers, PHI New Delhi.
2. Avrill M. Law & Kelton, Simulation Modeling and Analysis, McGraw Hill.
3. Jerry Banks et. al., Discrete Event System Simulation, Prentice Hall of India
4. Gordon Geoferry: "System Simulation, Prentice-Hall of India Pvt Ltd New Delhi-1993
5. Payne James, An Introduction to Simulation Programming Technique an Method of Analysis, McGraw –Hill International Editions Computer Science Series New York(1998).

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MT-PT-42(i) - ADVANCED COMPUTER NETWORKS

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT I.

Computer network concepts and Data communication concepts;
Layered communication architecture: layers, services, protocols, layer entities, service access points, protocol functions;
Journey of the Internet;
Secure routing and advanced routing algorithms;

UNIT II.

Future Internet architectures;
Interdomain and intradomain routing;
Advanced Network Congestion Avoidance and Control algorithms:
Increase and decrease; DCTCP; PCC; D3 and other algorithms;
Quality of service; and cloud services;

UNIT III.

Real Time Transport Protocol;
Internetworking; Performance Issues;
VPN networks; Software defined networks – architecture and other issues;
Network architectures for data centres.

UNIT IV.

Wireless Networks and Mobile Networks: LAN, PAN, Sensor Networks, Adhoc Networks;
Mobile IP; Mobile TCP;
IP Security; Network reliability;
Future Internet architectures;

REFERENCES

1. Andrew S. Tanenbaum, Computer Networks, Prentice Hall Pearson
2. William Stallings, Wireless Communications & Networks, Prentice-Hall Pearson
3. Jochen Schiller, Mobile Communication, Addison Wesley
4. Wright and W. Stevens, TCP/IP Illustrated, Volume 2, Addison-Wesley

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MT-PT-42(ii) – ADVANCED MICROPROCESSORS

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT I.

Introduction to Micro Processor and micro computer: Historical background, Modern micro processors and micro computers. Architecture of Pentium processor, Real and protected Modes of operations, addressing modes and instruction set of Pentium processor, concept of RISC and CISC micro processors.

UNIT II.

Memory Interface : Memory devices, address decoding, 8/16/32/64 - bit memory interfaces. Input/output interfaces: Introduction to I/O interfaces, I/O mapped I/O, memory mapped I/O, basic input interface and basic output interface, I/O port address decoding, 8/16/32 – bit wide I/O ports, 82C55 PPI.

UNIT III.

Interrupt structure: Basic interrupt processing, interrupt, instructions of Pentium, operations of real and protected mode interrupts,8259 PIC and its programming, expanding interrupt structure by cascading 8259's

Pentium, Pentium Pro Processor, Pentium II, Pentium III, and Pentium IV Architecture

UNIT IV.

Direct memory access: DMA data transfer and basic DMA operations, 8237 DMA controller, its programming.

Bus Interface: The 8/16 bit ISA bus and its interfacing with input and output ports, EISA 32 bit bus and its interfacing, VESA and VL buses, PCI and PCMCIA buses.

References:

1. Berry B. Brey, The Intel microprocessors: Architecture, programming and interface, PHI.
2. Liu and Gibson, Microcomputer systems: Architecture, programming and Design, PHI.
3. D V Hall, Microprocessors.
4. Triebel, The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware, and Applications, 4/e, Pearson Education.
5. Brey/Sharma, The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486 Pentium, Pentium Pro Processor, Pentium II, Pentium III, and Pentium IV: Architecture, Programming, and Interfacing, Pearson Education.

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MT-PT-42(iii)

SOFT COMPUTING

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit I

Working of a simple Genetic Algorithm and the related definitions: Representation/Encoding Schemes, initialising a GA population, evaluation function, genetic operators, study of parameters of genetic algorithms and its performance, sampling and selection mechanisms, mathematical foundations of genetic algorithms, schemata theorem and building block hypothesis, Optimizing humerical functions using GA.

Genetic Algorithm variations: Scaling fitness, Niching and speciation, Crowding Technique for Multimodal Problems, Multi-Objective Genetic Algorithms, Master Slave and Distributed Genetic Algorithms, Designing GAs for numerical optimization, knapsack problem, travelling salesperson and other similar problems.

Unit II

Neural networks: Basic terminology and definitions, Model of an artificial neuron, Sigmoid function, Neural Network Architectures, Characteristics of neural networks, Learning methods, Rosenblatt's perceptron, Fixed increment perceptron learning algorithm for a classification problem, Examples of learning of AND/OR gate by perceptron, XOR problem.

Back Propagation Neural Networks: Architecture of a backpropagation network, Model for multi-layer perceptron, Back propagation learning, Delta or gradient descent learning rule and effect of learning rate, Back propagation learning algorithm.

Unit III

Fuzzy sets: Basic terminology and definitions, Operations on Fuzzy sets, MF formulations and parameterisation, Derivatives of parameterised MFs, Fuzzy numbers, Extension principal and fuzzy relations, Linguistic variables, Fuzzy If-Then Rules, Fuzzy reasoning and compositional rule of inference.

Unit IV

Neuro-fuzzy hybrid systems – genetic neuro hybrid systems – genetic fuzzy hybrid and fuzzy genetic hybrid systems – simplified fuzzy ARTMAP – Applications: A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.

References:

1. David E. Goldberg, "Genetic Algorithms in Search, Optimization and machine learning", Thirteenth Ed., Addison Wesley.
2. Zbigniew Michalewicz, "Genetic algorithms +Data Structures = Evolution Programs", Third Ed., Springers-Verlag.
3. Lawrence Davis, Van Nostrand Reinhold, Handbook of genetic algorithms, New York.
4. J.S.R.Jang, C.T. Sun, E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI / Pearson Education.
5. S.N.Sivanandam , S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt Ltd.
6. J.Klir and George *"Fuzzy sets and Fuzzy logic"*, PHI

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MT-PT-51 RESEARCH METHODOLOGY

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

Unit-I

The objectives and dimensions of research: Why Research? What is research? How is research done?

Tools of research: Library, The Internet, and Measurements for Computer Science research

Statistics, Data analysis tools

Research proposal: Characteristics of a proposal, Weaknesses of proposals

Unit-II

The research problems: Finding a problem, stating the problem, identifying sub-problems

Review of related literature: Why review the literature, Including literature in research proposal

Planning the research project: The scientific method, Research planning, Data analysis

Unit-III

Conducting research in computer science: Software and hardware implementation, debugging, and evaluation

Research methodology: Quantitative and qualitative approach, The Quantitative study, Writing the research proposal: Characteristics of a proposal, Weaknesses of proposals

Unit-IV

Issue specific to computer science research: Data Collection, Model Development, Testing & Evaluation, Report Creation, Internationalization, Software Product, Web Updates, simulation in research.

References:

1. Research Methodology, APH Publishing House Corporation, by V.V. Khanrode.
2. Research Methodology, Commonwealth Publishers, by R.K. Verma et al.
3. Research Methodology, College Book, by R.N. Trivedi et al.
4. Research Methods by Lokesh Koul
5. Research Methodology, New Age International Publishers, by Kothari

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MT-PT-52(i) - ADVANCED ARTIFICIAL INTELLIGENCE

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT I.

Overview of Probability Theory, Bayes Networks, Independence, I-Maps, Undirected Graphical Models, Bayes Networks and Markov Networks, Local Models, Template Based Representation

UNIT II.

Exact Inference: Variable Elimination: Clique Trees, Belief Propagation, Tree Construction, Introduction to Optimization, Approximate Inference: Sampling, Markov Chains, MAP Inference. Inference in Temporal Models

UNIT III.

Learning Graphical Models: Introduction, Parameter Estimation, Bayesian Networks and Shared Parameters, Structure Learning, Structure Search, Partially Observed Data, Gradient Descent, Expectation – Maximization (EM), Hidden Variables

UNIT IV.

Undirected Models, Undirected Structure Learning, Causality, Utility Functions, Decision Problems, Expected Utility, Value of Information, Summary and Conclusions

REFERENCES:

1. Daphne Koller and Nir Friedman. Probabilistic Graphical Models, MIT Press.
2. S.Russell and P. Norvig. Artificial Intelligence: A Modern Approach.
3. Advanced Artificial Intelligence, Zhongzhi Shi, World Scientific, 2011.

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MT-PT-52(ii) - ADVANCED DIGITAL IMAGE PROCESSING

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note:-Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT I

Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, 2D image transforms-DFT, DCT, KLT, and SVD. Image enhancement in spatial and frequency domain, Review of morphological image processing

Edge detection, Thresholding, Region growing, Fuzzy clustering, Watershed algorithm, Active contour methods, Texture feature based segmentation, Model based segmentation, Atlas based segmentation. Wavelet based Segmentation methods

UNIT II

First and second order edge detection operators, Phase congruency, Localized feature extraction-detecting image curvature, shape features Hough transform, shape skeletonization, Boundary descriptors, Moments, Texture descriptors, Autocorrelation, Co-occurrence features, Run length features, Fractal model based features, Gabor filter, wavelet features.

UNIT III

Registration- Preprocessing, Feature selection-points, lines, regions and templates Feature correspondence-Point pattern matching, Line matching, region matching Template matching. Transformation functions-Similarity transformationand Affine Transformation. Resampling-Nearest Neighbour and Cubic Splines Image Fusion-Overview of image fusion, pixel fusion, Multiresolution based fusiondiscrete wavelet transform, Curvelet transform. Region based fusion.

UNIT IV

Sources of 3D Data sets, Slicing the Data set, Arbitrary section planes, The use of color, Volumetric display, Stereo Viewing, Ray tracing, Reflection, Surfaces, Multiply connected Surfaces, Image processing in 3D, Measurements on 3D images.

REFERENCES

1. John C.Russ, "The Image Processing Handbook", CRC Press, 2007.
2. Mark Nixon, Alberto Aguado, "Feature Extraction and Image Processing", Academic Press, 2008.
3. Ardeshir Goshtasby, " 2D and 3D Image registration for Medical, Remote Sensing and Industrial Applications",John Wiley and Sons, 2005.
4. Rafael C. Gonzalez, Richard E. Woods, . Digital Image Processing', Pearson,Education, Inc., Second Edition, 2004.
5. Anil K. Jain, Fundamentals of Digital Image Processing', Pearson Education,Inc., 2002.

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MT-PT-52(iii) ADVANCED COMPILER DESIGN

L/T	P	Credit	Int	Ext
4	-	4	30	70

Note:- Total 09 Questions are to be set by the examiner. First question will be compulsory consisting of 5 short (each 2 marks) questions covering entire syllabus uniformly. In addition 8 more questions will be set unit wise comprising 2 questions from each unit of the given syllabus. A candidate is required to attempt five questions in all selecting one question from each unit including the compulsory question.

UNIT I.

Introduction to code optimization - kinds of optimization, levels of optimization
Optimizing transformations - compile time evaluation, CSE, constant propagation, variable propagation, code movement optimization, Instruction-level parallelism.

UNIT II.

Strength reduction, loop test replacement, Dead code elimination
DAG based local optimization
Abstract syntax tree, triples, quadruples.
Global optimization: Control flow analysis---dominators and post dominators. Data flow analysis---available expressions

UNIT III.

Elements of the partial redundancy elimination (PRE) problem.
Partial redundancy elimination (PRE)---overview, historical.
PRE by using eliminatability paths.
Optimal code generation for expressions: Key issues---instruction selection, evaluation order, register utilization.
Parsing and pattern matching approaches.

UNIT IV.

Optimal code generation for expressions: Key issues---instruction selection, evaluation order, register utilization.
Parsing and pattern matching approaches.
Optimal code generation for expressions: Ershov approach---contiguous evaluation of an expression, register requirement of nodes in expression trees.
Overview of the Aho-Johnson approach. Width of program.
Code generation algorithm of Aho-Johnson.

REFERENCES:

1. Aho, Sethi, and Ullman,Compilers: Principles, Techniques, and Tools, Addison-Wesley
2. Steven S. Muchnick, Advanced Compiler Design Implementation, Morgan Kaufmann

Staff council PGBOS & R (committee)

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