Pre-Ph-D Course

i) The duration of the Pre-Ph.D. course will be of one semester.

ii) The Department concerned shall design the Pre-Ph.D. course as per latest guide lines of UGC which are:
   “The Pre-Ph.D. course must include a course on research methodology which may include quantitative methods and computer applications. It may also involve review of published research in relevant area”.

iii) The scheme for Pre-Ph.D. course work is as under:
   a) Common course:
      PhD-FET-101: Research Methodology (Quantitative Techniques and Computer Applications in Research)
   b) Departmental course:
      PhD-FET-102: Review of Literature and Seminar (in Relevant Research Area)
      PhD-FET-103: Elective Subject (Departmental Elective Subject)

iv) The qualifying marks in each paper of the course work shall be 50%.

vi) It is only on satisfactory completion of Pre-Ph.D Programme, which shall be an essential part and parcel of the Ph.D. programme that a candidate shall be eligible to apply for registration in Ph.D. Programme.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Marks of Internal</th>
<th>Examination Marks</th>
<th>Total Marks</th>
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<tbody>
<tr>
<td>1</td>
<td>PhD-FET-101</td>
<td>Research Methodology (Quantitative Techniques and Computer Applications in Research)</td>
<td>20</td>
<td>80</td>
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<td>2</td>
<td>PhD-FET-102</td>
<td>Review of Literature and Seminar (in Relevant Research Area)</td>
<td>20</td>
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<td>3</td>
<td>PhD-FET-103</td>
<td>Elective Subject (Departmental Elective Subject)</td>
<td>20</td>
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** Based on two assignments of 10 marks each
## SYLLABUS (Pre PhD CSE)

### List of Departmental Elective Subjects:

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<thead>
<tr>
<th>No.</th>
<th>Code</th>
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<tbody>
<tr>
<td>1</td>
<td>PhD-CSE-101</td>
<td>Advanced Information Security Systems</td>
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<tr>
<td>2</td>
<td>PhD-CSE-102</td>
<td>Digital Image Processing</td>
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<td>3</td>
<td>PhD-CSE-103</td>
<td>Neural Networks</td>
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<td>4</td>
<td>PhD-CSE-104</td>
<td>Advanced Topics in Database Systems</td>
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<td>5</td>
<td>PhD-CSE-105</td>
<td>Performance Modeling</td>
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<td>6</td>
<td>PhD-CSE-106</td>
<td>Data Warehousing and Mining</td>
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<td>7</td>
<td>PhD-CSE-107</td>
<td>Software Testing and Quality Assurance</td>
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<td>PhD-CSE-108</td>
<td>Embedded Systems</td>
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<td>PhD-CSE-109</td>
<td>Advanced Wireless Networks</td>
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<td>Genetic Algorithms</td>
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<td>PhD-CSE-111</td>
<td>Grid Computing</td>
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<td>PhD-CSE-112</td>
<td>Mobile Computing</td>
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<td>PhD-CSE-113</td>
<td>Advanced Multimedia Technology</td>
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<td>14</td>
<td>PhD-CSE-114</td>
<td>Parallel Computing</td>
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<td>PhD-CSE-115</td>
<td>Web Engineering</td>
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<td>PhD-CSE-116</td>
<td>Fuzzy Logic</td>
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<td>PhD-CSE-117</td>
<td>Advanced Networking and Protocols</td>
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<td>PhD-CSE-118</td>
<td>Intelligent Systems</td>
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<td>PhD-CSE-119</td>
<td>Information Processing and E-commerce</td>
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<td>PhD-CSE-120</td>
<td>Information Hiding Techniques</td>
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<td>21</td>
<td>PhD-CSE-121</td>
<td>Data Modeling and Design</td>
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<td>22</td>
<td>PhD-CSE-122</td>
<td>Structured Systems Analysis, Design and Testing</td>
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<td>23</td>
<td>PhD-CSE-123</td>
<td>Information Theory and Coding</td>
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<tr>
<td>24</td>
<td>PhD-CSE-124</td>
<td>Fault Tolerant System</td>
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**Note:** The departmental elective subjects will be offered as per availability of expertise and the required infrastructure in the department.
UNIT I: Element of Research
Scientific process meaning and definition, a brief history of scientific process. Introduction to research methodology- Meaning of research, objective of research, types of research, significance of research, problem encountered by researchers in India. Research problem- Definition, necessity and techniques of defining research problem, formulation of research problem, objective of research problem, research design- Meaning, need and features of good research design, types of research designs, basic principles of Experimental design. Sampling design, census and sample surveys, different types of sample designs, characteristics of good sample design, Techniques of selecting a random sample. Data collection-primary and secondary data, methods of selecting primary and secondary data.

UNIT II: Hypothesis & Statistical Analysis
Hypothesis- definition, testing of hypothesis, procedures of hypothesis testing, flow diagram for hypothesis testing, parametric and non-parametric tests for testing of hypothesis, limitations of tests of hypothesis. Hypothesis tests- One sample test-two sample tests/ chi square tests, association of attributes. T-tests, statistical analysis, correlation and regression analysis- analysis of variance, completely randomized design, randomized complete block design, Latin square design, partial and multiple correlations – discriminant analysis - cluster analysis – principle component and factor analysis, repeated measure analysis. Probability and probability distributions; Binomial, Poisson, distribution, Basic ideas of testing of hypotheses; Tests of significance based on normal distributions.

UNIT III: Paper Writing and Report Generation
Basic concepts of paper writing and report generation, review of literature, concepts of bibliography and references, significance of report writing, steps of report writing, types of research reports, methods of presentation of report.

UNIT IV: Computer Applications in Research
Computer Applications: Fundamentals of computers-Definition, types of computers, RAM, ROM, CPU, I/O devices, Number systems-Binary, octal and hexadecimal, base conversion, logic gates- AND, OR, NOT, Operating system-definition, types of operating system, Database system – definition & applications, Networks – definition & applications, Internet & its applications, Web Searching, Email, Uses of software’s MS-Office-Power Point, Word, Excel and Access.

Text Books:
PhD- FET-102: REVIEW OF LITERATURE AND SEMINAR
(in Relevant Research Area)

1. The research student is required to prepare a concept paper/working, paper/review paper by reviewing at least 50 research papers / references books / unpublished doctoral dissertations / other reports etc.

2. To qualify the paper the research student is required either to present the prepared paper in an International Conference/ Seminar/ Workshop or publish the same in a research journal. Acceptance for publication or presentation will be considered as published/ presented.

3. A duly constituted committee of three teachers of the department by the Director/Head shall evaluate the completion of the paper.
PhD-CSE-101: ADVANCED INFORMATION SECURITY SYSTEMS

**Note:** Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions taking at least one question from each unit. Question no. 1 is Compulsory. All questions shall carry equal marks.

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**Duration of Exam:** 3 Hrs

**UNIT 1: CRYPTOGRAPHY**

**UNIT II: INFORMATION THEORY**

**UNIT III: MATHEMATICAL SECURITY**

**UNIT IV: NETWORK SECURITY**

**References:**
- Digital Certificates Applied Internet Security", Jalal Feghhi, Jalll Feghhi and Peter Williams, Addison Wesley Longman.
- Introduction to Cryptography with Coding Theory, Wade Trppe, Lawrence C., Washington, Pearson Education.
PhD-CSE-102: DIGITAL IMAGE PROCESSING

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions at least one question from each unit. Question no. 1 is Compulsory. All questions shall carry equal marks.

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Duration of Exam: 3 Hrs

UNIT I: Introduction and Fundamentals

UNIT II: Image Enhancement in Spatial Domain & Frequency Domain
Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Introduction to Fourier Transform and the frequency Domain, Properties of 2-D Fourier Transform, Smoothing and Sharpening Frequency Domain Filters.

UNIT III: Image Restoration & Compression

UNIT IV: Image Segmentation & Object Recognition
Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Patterns and Pattern Classes, Minimum Distance Classifier, matching by Correlation, bayes Classifier

Text/Reference Books:
UNIT 1: Neuron Model and Network Architectures
Objective, History, Applications, biological inspiration, Neuron Model, Transfer Functions, Network Architectures.

UNIT II: Learning Rules

UNIT III: Transformations & Optimization
Linear Vector Spaces, Spanning a Space, Inner Product, Norm, Orthogonality, Vector Expansions, Linear Transformations, Matrix Representations, Change of Basis, Eigenvalue and Eigenvectors.
Performance surfaces and Optimization: Taylor Series, Directional Derivatives, Necessary Condition for Optimality, Quadratic Functions, Optimization Techniques; Steepest Descent, Newton’s method, Conjugate Gradient Method.

UNIT IV: Backpropagation & Competitive Networks
The Backpropagation Algorithm; Performance Index, Chain Rule, Example, Drawbacks of Backpropagation, Heuristic Modifications; Momentum, Conjugate Gradient, Levenberg-Marquardt Algorithm.

Text/Reference Books:
PhD-CSE-104: ADVANCE TOPICS IN DATABASE SYSTEMS

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions at least one question from each unit. Question no. 1 is Compulsory. All questions shall carry equal marks.

L T P/D Marks of Internal: 20
3 - - Examination: 80
Duration of Exam: 3 Hrs Total Marks: 100

UNIT 1: Indexing
Types of Single-Level Ordered Indexes, Multilevel Indexes, Dynamic Multilevel Indexes Using B-trees and B+-trees

UNIT II: Concurrency control
Locking Techniques for Concurrency Control, Concurrency Control Techniques Based on Timestamp Ordering

UNIT III: Transactions Processing

UNIT IV: Parallel & Distributed databases
Introduction, I/O parallelism, inter-query parallelism, intra-query parallelism, interoperation parallelism, Design of parallel systems. Distributed data storage, Network transparency, Distributed query processing, Distributed transaction model, commit protocols, coordinator selection, concurrency control, deadlock handling.

TEXT BOOKS
- Data Management & file Structure by Loomis, 1989, PHI
PhD-CSE-105: PERFORMANCE MODELING

**Note:** Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions at least one question from each unit. Question no. 1 is Compulsory. All questions shall carry equal marks.

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**Duration of Exam:** 3 Hrs

**UNIT 1: Probability**
Review of Probability, Random variables and Distributions; Generating functions and transforms; Poisson, Markov and semi-Markov processes.

**UNIT II: Queuing Systems**
Characteristics of queueing systems; Little’s formula; Markovian and non-Markovian queueing systems; embedded Markov chain applications to M/G/1, G/M/1, and related queueing systems.

**UNIT III: Networks Simulations**
Networks of queues; open and closed queueing networks, algorithms to compute the performance metrics. Simulation techniques for queues and queueing networks.

**UNIT IV: Advanced Topics**
Advanced topics like queues with vacations, priority queues, queues with modulated arrival process, and discrete time queues; introduction to matrix-geometric methods; applications of the theory to the performance modelling of computer and communication networks.

**Texts and References:**
UNIT-I: Data Warehousing Architecture
Introduction to Data Warehousing: Evolution of Data Warehousing, Data Warehousing concepts, Benefits of Data Warehousing, Comparison of OLTP and Data Warehousing, Problems of Data Warehousing. Architecture: Operational Data and Datastore, Load Manager, Warehouse Manager, Query Manager, Detailed Data, Lightly and Highly summarised Data, Archive/Backup Data, Meta-Data, architecture model, 2-tier, 3-tier and 4-tier data warehouse, end user Access tools.

UNIT-II: Data Warehousing Tools and Technology
Tools and Technologies: Extraction, cleaning and Transformation tools, Data Warehouse DBMS, Data Warehouse Meta-Data, Administration and management tools, operational vs. information systems. OLAP & DSS support in data warehouse.

UNIT-III: Distributed Data Warehouse & Knowledge discovery
Types of Distributed Data Warehouses, Nature of development Efforts, Distributed Data Warehouse Development, Building the Warehouse on multiple levels. Knowledge discovery through statistical techniques, Knowledge discovery through neural networks, Fuzzy technology & genetic algorithms.

UNIT-IV: Types of Data Warehouses & Data Warehouse Design
Host based, single stage, LAN based, Multistage, stationary distributed & virtual data-warehouses. Data warehousing Design: Designing Data warehouse Database, Database Design Methodology for Data Warehouses, Data Warehousing design Using Oracle, OLAP and data mining: Online Analytical processing, Data mining.

Text Books:
UNIT-I: Introduction
A perspective on Testing, STLC, Functional testing: Boundary value testing, Equivalence – class testing, Decision Table Testing etc., Retrospective on Functional Testing; Structural testing: path testing, data flow testing, mutation testing, etc. Retrospective testing, Levels of testing: Integration testing, system testing, acceptance testing.

UNIT-II: Tools & Technologies

UNIT-III: Quality Models
Introduction to Software Quality, Quality Models: McCall’s Model, Hierarchical model FCMM, Measuring Software Quality, Quality Metrics: Process, Product, Quality Control Tools, Quality assurance concept, importance, Requirements for SQA works,

UNIT-IV: Standards

References:
2) Software Testing – A Craft’s man Approach, Paul C. Jorgensen , A CRC Press LLC.
3) Software Quality Theory and Management by Alan C. Gillies, Chapman & Hall.
4) Software Quality by Galrry S. Marliss , Thomson.
UNIT-I: Introduction
The concepts of embedded system design, embedded microcontroller cores, embedded memories, examples of embedded systems. Technological aspects of embedded system: interfacing between analog and digital blocks, signal conditioning, Digital signal processing, subsystem interfacing, interfacing with external systems, user interfacing, Design tradeoffs due to process compatibility, Thermal consideration etc. Software aspects of embedded systems: real time programming languages and operating systems.

UNIT-II: Architecture
Introduction, CPU architecture, registers, instruction sets addressing modes Loop timing, timers, Interrupts; Interrupt timing, I/o Expansion, I2C Bus Operation Serial EEPROM, Analog to digital converter, UART Baud Rate-Data Handling-Initialization, Special Features - serial Programming-Parallel Slave Port.

UNIT-III: Processors

UNIT-IV: System Development

Text Books:

References:
UNIT-I: Transmission & Spread Spectrum Techniques

UNIT-II: Cellular & CDMA Technology
Cellular Network Concept, First Generation (1G) Analog, Second Generation (2G) Digital TDMA. GSM and mobility management in GSM, Third Generation Systems (3G) CDMA and 4 G Technology overview. Principles of Wideband CDMA (WCDMA), CDMAOne and CDMA2000, Universal Mobile Telecommunications System (UMTS), Evolution of Mobile Communication Networks, Call Controls and Mobility Management in CDMA. Quality of Service (QoS) in 3G Systems, CDMA network planning, design and applications

UNIT-III: Blue Tooth & IEEE 802.11 Wireless Networks

UNIT-IV: Wireless Application Protocol (WAP)

Text/Reference:
PhD-CSE-110: GENETIC ALGORITHMS

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions at least one question from each unit. Question no. 1 is Compulsory. All questions shall carry equal marks.

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UNIT-I: Genetic Algorithms in Scientific models

UNIT-II: Theoretical & Implementation of GA
Schemas & Two-Armed and k-armed problem, royal roads, exact mathematical models of simple genetic algorithms, Statistical- Mechanics Approaches. Data structures, Reproduction, crossover & mutation, mapping objective functions to fitness form, fitness scaling, coding, a multiparameter, mapped, fixed point coding, discretization and constraints.

UNIT-III: Applications of genetic algorithms
The risk of genetic algorithms, De Jong & function optimization, Improvement in basic techniques, current application of genetic algorithms

UNIT-IV: Advanced operators & techniques in genetic search
Dominance, duplicity, & abeyance, inversion & other reordering operators. Other micro operators, Niche & speciation, multiobjective optimization, knowledge based techniques, genetic algorithms & parallel processors.

Text Books:

References:
UNIT-I: Introduction

UNIT-II: Benefits & Status of Technology

UNIT-III: Architectures

UNIT-IV: Standards

Text Books:
A Network Approach to Grid Computing, Daniel Minoli, Wiley Publication.

References:
**PhD-CSE-112: MOBILE COMPUTING**

**Note:** Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions at least one question from each unit. Question no. 1 is Compulsory. All questions shall carry equal marks.

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**UNIT-I: Overview**
Mobile Computing and Applications, Overview 1G, 2G, 3G, 4G technologies, Mobile IP and IPv6, VoIP.
CDPD- Architecture, air interface, radio resource allocation, roaming management.
Mobile Adhoc networks: Characteristics of MANETs, spectrum of MANET applications, Security consideration in MANETs, AODV, DSR routing protocols

**UNIT-II: Mobility Management**
Location Management, InterBS Handoff, Intersystem Handoff, Detection and assignment for handoff management, Strategies for handoff detection-Mobile controlled handoff, Network controlled handoff, mobile assisted handoff, handoff failure, hard handoff-MCHO link transfer, MAHO/NAHO link transfer, Soft handoff-adding and dropping new BS.

**UNIT-III: Mobile Services**
3G mobile services: Paradigm shift in 3G systems, WCDMA, CDMA2000, Improvements on core network, quality of service in 3G, Wireless operating systems for 3G handsets, DoCoMo W-CDMA field trial. GSM: Architecture, location tracking and call setup, security, data services-HSCSD, GPRS, GSM location updates, mobility databases, failure restoration, International GSM call setup, reducing international call delivery cost,

**UNIT-IV: WAP & Markup Scripts**
Wireless application protocol: WAP model, WAP gateway, WAP protocols—wireless datagram protocol, wireless transport layer security, wireless transaction protocol, wireless session protocol, wireless application environment, wireless local loop architecture and deployment issues, wireless local loop technologies-satellite based systems, cellular based systems, fixed wireless access systems.

**Text Books:**
2. Wrox “The beginning WML and WML script”, Wrox Publication
3. John Schiller
PhD-CSE-113: ADVANCED MULTIMEDIA TECHNOLOGY

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions at least one question from each unit. Question no. 1 is Compulsory. All questions shall carry equal marks.

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UNIT-I: Introduction
Concept of Multimedia, Media & data stream, main properties of multimedia system, Data stream characteristics & for continuous media Multimedia Applications, Hardware Software requirements, Storage Technologies: RAID, Optical Media.

UNIT-II: Compressions & File formats

UNIT-III: Animations
Introduction, Basic Terminology techniques, tweaning & morphing, Motion Graphics 2D & 3D animation. Animation: Key frame animation, reactive animation, path animation, Skelton animation etc., de former s.

UNIT-IV: Advanced Topics
Dynamics: soft bodies, Rigid bodies and its usages in the scene etc., Rendering: soft, Hard rendering, IPR rendering, Line and box rendering etc., Special Effects: Shading & Texturing Surfaces, Lighting, Special effects. Working with MEL: Basics & Programming

Text Book:

Reference Books:
3. Maya manuals.
PhD-CSE-114: PARALLEL COMPUTING

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions at least one question from each unit. Question no. 1 is Compulsory. All questions shall carry equal marks.

L T P/D Marks of Internal: 20
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UNIT-I: Parallel and Network Models
The state of computing, multiprocessors and multicomputers, multivector and SIMD computers, architectural development tracks.

UNIT-II: Processors and Memory Hierarchy
Advanced processor technology- CISC, RISC, Superscalar, Vector, VLIW and symbolic processors. Memory hierarchy technology, Virtual memory technology (Virtual memory models, TLB, paging and segmentation). Cache memory organization, shared memory organization, sequential and weak consistency models

UNIT-III: Pipelining and Super scalar techniques
Linear Pipeline Processors, Nonlinear Pipeline processors, Instruction Pipeline Design, Arithmetic Pipeline Design.

UNIT-IV: Parallel and Scalable Architecture

Text:

References:
PhD-CSE-115: WEB ENGINEERING

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions at least one question from each unit. Question no. 1 is Compulsory. All questions shall carry equal marks.

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Duration of Exam: 3 Hrs

UNIT-I: Information Architecture

UNIT-II: Dynamic HTML and Web Designing

UNIT-III: Java Server Pages and Active Server Pages
Basics, Integrating Script, JSP/ASP Objects and Components, configuring and troubleshooting,: Request and response objects, Retrieving the contents of a an HTML form, Retrieving a Query String, Cookies, Creating and Reading Cookies. Using application Objects and Events.

UNIT-IV: Overview of advance features of XML
Basics, Integrating Script, Objects and Components, Configuring and troubleshooting, advanced features & their creation and applications, embedding XML with other tools.

Text Books:
- HTML The complete Reference, TMH
- CGI Programming with Perl 2/e, Scott Guelich, Shishir Gundavaram, Gunther Birzniek; O’Reilly
- Doug Tidwell, James Snell, Pavel Kulchenko; Programming Web Services with SOAP, O’ Reilly
- Pardi, XML in Action, Web Technology, PHI
PhD-CSE-116: FUZZY LOGIC

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions at least one question from each unit. Question no. 1 is compulsory. All questions shall carry equal marks.

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UNIT-I: Fuzzy Logic

UNIT-II: Fuzzy Arithmetic

UNIT-III: Uncertainty based Information
Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets, Bayesian Theory & other uncertainty theories.

UNIT-IV: Applications & Genetic Algorithms

Text Books:

Reference books:
UNIT-I: Review of Basic Concepts
Network Architecture- Protocol Hierarchies, Layered model, Services, Interface, Reference Models, Underlying Technologies, LAN’s (Ethernet, Token Ring, Wireless), Point-to-Point WAN’s, Switched WAN’s (X.25, Frame Relay, ATM)

UNIT-II: Internet Layer Protocols
IP- Datagram, fragmentation and reassembly, ICP, ICMP
Interior and Exterior Routing- RIP, OSPF, BGP, Multicast Routing- Unicast, Multicast and Broadcast, Multicasting

UNIT-III: The Transport Layer
The transport service-Services provided, Service primitives, Sockets, Elements of transport protocols-addressing, connection establishment, connection release, flow control and buffering, multiplexing, crash recovery, UDP-Introduction, Remote Procedure Call, TCP- Service model, Protocol, frame format, connection establishment release, connection management

UNIT-IV: The Application Layer
DNS, Telnet and Rlogin, FTP, TFTP, SNMP, SMTP, World Wide Web (Client and Server Side, cookies, wireless web), Java and the Internet, Multimedia (streaming audio, Internet Radio, voice over IP, video standards) Real time traffic over the internet

References:

PhD-CSE-118: INTELLIGENT SYSTEMS

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions at least one question from each unit. Question no. 1 is Compulsory. All questions shall carry equal marks.

L T P/D Marks of Internal: 20
3 - - Examination: 80
Duration of Exam: 3 Hrs Total Marks: 100

UNIT-I: Introduction

UNIT-II: Searching Techniques
Informed search strategies – heuristic function – local search algorithms and optimistic problems – local search in continuous spaces – online search agents and unknown environments – Constraint satisfaction problems (CSP) – Backtracking search and Local search – Structure of problems – Adversarial Search

UNIT-III: Knowledge Representation

UNIT-IV: Learning

Text Books:

References:
UNIT-I: Compression
Compression & Decompression Techniques – Loosy & Loose less Techniques, Different formats of multimedia files such as images, videos and audios will be studied

UNIT-II: Algorithms and Analysis
Elementary data Structures and their operations, Basic search and traversal techniques, Divide-Conquer techniques, Greedy method, Branch bound.

UNIT-III: Searching & Computing

UNIT-IV: E-Commerce

References:
6. Jeffery: Introduction to E-Commerce, TMH.
7. Fundamentals of computer algorithms by Horowitz, Ellis; Sahni, Sartaj & Rajasekaran, university Press.
8. Cloud Computing: Web-Based Applications that change the way you work and collaborate By Michael miller.
UNIT- I:  Introduction
Introduction to Information Hiding: Types of Information Hiding, Applications, Importance & Significances. Differences between cryptography and steganography, Wisdom from Cryptography, types of steganography their application and significances. Past present and future of steganography

UNIT- II:  Principles of Steganography

UNIT- III:  Watermarking and Copyright Protection
Basics of watermarking, Watermarking process, Watermarking applications, Requirements and Algorithmic Design Issues, Evaluation and Benchmarking of Watermarking, Bit plane of an Image, study of noises in stego images and their comparisons, Robustness of watermarking schemes on different attacks like blurring, cropping, compression of the image. PSNR calculation of the images.

UNIT IV:  Biometrics & Frame proof codes
Use of image steganography in biometric sciences, Study of security enhancement of biometric template using steganographic Frame proof codes:- Definition, Introduction of frame proof codes, Methods to obtain 2-frame proof codes using mutually orthogonal latin squares. Use of frame proof codes in ownership and software piracy.
UNIT-I: Conceptual Modeling
Conceptualization and 100% principles, ER, SHM, SHM+
Conversion of conceptual schemas to relational models
High and Low CASE tools

UNIT-II: Object oriented modeling
Functional modeling, dynamic modeling, and object modeling, Representation of these in UML
Principles of class design: Open closed principle, Liskov’s substitution principle, dependency inversion principle

UNIT-III: Multidimensional modeling
Facts, dimension, aggregate, star schema, snowflake schema, constellation.
Conversion of ER to star schema, Star schema to relational schema, using multidimensional data structures

UNIT-IV: Structured systems analysis
Statement of purpose, context diagram, developing process hierarchy. Use cases XML, XML schema, XML query
UNIT-I: Structured systems design & Principles
Structuring definition, application to real world phenomena,
Data Flow Diagrams, principles of module design, cohesion, coupling

UNIT-II: Structured programming languages
Data structuring: need, definition, evolution of data structuring in Fortran,
COBOL, Pascal, C Control structuring: need, definition, control structuring in
Fortran, COBOL, Pascal, C program structuring: need, side effects, calling
conventions and their applications in program structuring.

UNIT-III: Testing Structured Systems
Testing life cycle, Notion of a test case,
White box testing: statement testing, branch testing, condition testing, basis path,
cyclomatic complexity, loop testing, testing recursive programs
Integration testing: top down and bottom up testing, stubs and drivers
Black box testing: domain testing, equivalence class testing, boundary value
testing and its different forms, Cause-effect graphs.

UNIT-IV: Structured systems analysis
Statement of purpose, context diagram, developing process hierarchy. Use cases.
PhD-CSE-123: INFORMATION THEORY AND CODING

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions at least one question from each unit. Question no. 1 is Compulsory. All questions shall carry equal marks.

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Unit 1: Information Theory
Marginal, joint and conditional entropy, information rate, mutual information, channel capacity of various channels, cascaded channels, repetition of signals

Unit 1: Shannon’s theorem
Shannon Hartley theorem, bandwidth- S/N ratio tradeoff, continuous channel, negative entropy

Unit 1: Coding
Irreducibility, separatibility, coding efficiency, source encoding, Shannon Fano code, Huffman code, and data compression

Unit 1: Channel Encoding
Minimum distance, error detection and correction, FEC and ARQ, block code, convolution codes, and cyclic codes, signal error correction, multiple error correction, burst error correction, Cryptography, Encryption and decryption

References:
1. Information Theory; F.M Reza; McGraw Hills
2. Digital and Analog Communication Systems; K Sam Shanmugam; John Wiley
3. Communication Systems: Analog and digital; Singh and Sapre; TMH 1995
4. Digital Communication; B. Sklar; Pearson Education Asia
PhD-CSE-124: FAULT TOLERENT SYSTEM

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions at least one question from each unit. Question no. 1 is Compulsory. All questions shall carry equal marks.

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Unit 1: Introduction


Unit II: Error models


Unit III: Experimental Evaluation

Network fault tolerance: Reliable communication protocols, Agreement protocols, Database commit protocols - Application: Distributed SQL server

Check pointing & Recovery - Application: Micro check pointing, IRIX Checkpoints

Experimental Evaluation: Modeling and simulation based, Fault injection based - Application: NFTAPE fault injector

Modeling for performance, dependability and performability: dependability-specific methods (fault trees, reliability block diagrams), queues, stochastic Petri nets and stochastic activity networks - Application: UltraSAN

Unit IV: Practical Systems for Fault Tolerance


REFERENCES


