UNIVERSITY INSTITUTE OF ENGINEERING & TECHNOLOGY MAHARSHI DAYANAND UNIVERSITY, ROHTAK SCHEME OF STUDIES & EXAMINATIONS

Doctor of Philosophy (Ph.D.) – COMPUTER SCIENCE & ENGINEERING Jan,17 to Dec,17

i) The duration of the 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 -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 Ph.D. course work is as under:
a) Common course:
17CSEPCC1: Research Methodology (Quantitative Techniques and Computer Applications in Research)
b) Departmental course:
17CSEPCC2: Review of Literature and Seminar (in Relevant Research Area)
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 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.

Sr. No.	Course No.	Course Title	Marks** of Internal	Examination Marks		Total Marks	Duration of Exam
				Theor	Practical		
1	17CSEPCC1	Research Methodology (Quantitative Techniques and Computer Applications in Research)	20	80	-	100	3
2	17CSEPCC2	Review of Literature and Seminar (in Relevant Research Area)	20	-	80	100	3
3		Elective Subject (Departmental Elective Subject) any one from the list attached	20	80	-	100	3
	Total		60	160	80	300	

** Based on two assignments of 10 marks each

SYLLABUS (PhD CSE)

List of Departmental Elective Subjects:

1	17CSEPCD1	Advanced Information Security Systems
2	17CSEPCD2	Digital Image Processing
3	17CSEPCD3	Neural Networks
4	17CSEPCD4	Advanced Topics in Database Systems
5	17CSEPCD5	Performance Modelling
6	17CSEPCD6	Data Warehousing and Mining
7	17CSEPCD7	Software Testing and Quality Assurance
8	17CSEPCD8	Embedded Systems
9	17CSEPCD9	Advanced Wireless Networks
10	17CSEPCD10	Genetic Algorithms
11	17CSEPCD11	Grid Computing
12	17CSEPCD12	Mobile Computing
13	17CSEPCD13	Advanced Multimedia Technology
14	17CSEPCD14	Parallel Computing
15	17CSEPCD15	Web Engineering
16	17CSEPCD16	Fuzzy Logic
17	17CSEPCD17	Advanced Networking and Protocols
18	17CSEPCD18	Intelligent Systems
19	17CSEPCD19	Information Processing and E-commerce
20	17CSEPCD20	Information Hiding Techniques
21	17CSEPCD21	Data Modeling and Design
22	17CSEPCD22	Structured Systems Analysis, Design and Testing
23	17CSEPCD23	Information Theory and Coding
24	17CSEPCD24	Fault Tolerant System

Note: The departmental elective subjects will be offered as per availability of expertise and the required infrastructure in the department.

Program Specific Outcomes PSO – Ph.D. (Computer Sc & Engg)

At the end of the programme, the student shall be able to

PSO1: acquire the necessary theoretical tools as well practical tools to undertake the research in various fields of Computer Science and Engineering.

PSO2: Get expertise in understanding, formulating and solving new and cutting edge problems in various fields of Computer Science and Engineering.

PSO3 : Address the problems of society and industrial interests in various applicable themes.

PSO4 :Produce and disseminate the new knowledge in high quality, peer reviewed research journals and Ph.D. thesis.

PSO5: conduct scholarly or professional activities in an ethical manner.

17CSEPCC1: RESEARCH METHODOLOGY (Quantitative Techniques and Computer Applications in Research)

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.

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

Course Outcomes (COs): After studying this course, students will be able:

CO 1- understand basic elements of research like types of research, significance, necessity and techniques of defining research problem etc.

CO 2- Understand hypothesis and statistical analysis

CO 3- Knowledge of writing research paper

CO 4- Knowledge of computer applications in research.

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 – discriminent 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:

1. C. R. Kothari – Research Methodology Methods and Techniques – Wishwa Prakashan Publishers – Second Edition.

17CSEPCC2**: REVIEW OF LITERATURE AND SEMINAR**
(in Relevant Research Area)

Course Outcomes (COs): After studying this course, students will be able:
CO 1- understand basic elements of research and write a relevant paper after reviewing literature
CO 2- Understand hypothesis and statistical analysis
CO 3- Knowledge of writing research paper
CO 4- present/communicate a research paper in a conference/journal.

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.

17CSEPCD1: 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.

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

Course Outcomes:

CO1. To master information security governance, and related legal and regulatory issues.

CO2. To be familiar with how threats to an organization are discovered, analyzed, and dealt with.

CO3. To be familiar with network security threats and countermeasures.

CO4. To be familiar with network security designs using available secure solutions (such as PGP, SSL, IPSec, etc).

CO5. To be familiar with advanced security issues and technologies (such as DDoS attack detection and containment, and anonymous communications).

UNIT 1: CRYPTOGRAPHY

Basic Concepts, Cryptosystems, Crypto-Analysis, Ciphers & Cipher Modes, DES, AES, RSA algorithm, Key Management Protocols, Diffie Hellmann Algorithm, Digital Signatures, Message Digest, Secure Hash Algorithms, Public Key Infrastructure.

UNIT II: INFORMATION THEORY

Basic of Probability & Statistics, Shannon Characteristics, Perfect Secrecy, Confusion and Diffusion, Information Theoretic Tests, Unicity Distance, Entropy, Floating Frequency, Histogram, Autocorrelation, Periodicity, Random Analysis Tests, Zero Knowledge Technique.

UNIT III: MATHEMATICAL SECURITY

Basic Number Theory, Congruence, Chinese Remainder Theorem. Finite Fields, Discrete Logarithm, Bit Commitment, Random Number Generation, Inverses, Primes, Greatest Common Divisor, Euclidean Algorithm, Modular Arithmetic, Properties of Modular Arithmetic, Computing the inverse, Fermat's Theorem, Algorithm for Computing Inverses, NP-Complete Problems, Characteristics of NP-Complete Problems, Meaning of NP-Completeness, NP-Completeness and Cryptography.

UNIT IV: NETWORK SECURITY

Network Threats, Authentication & Access Control Mechanism, Secured Communication Mechanisms, Biometric, Secured Design for LAN, Firewall, Intrusion Detection System, Virtual Private Network, Email and Web Security. WEP, Access Controls, Secure Socket Layer, IPSEC, WAP Security, Security Issues, Challenges & Defense Mechanisms for Bluetooth, GSM, CDMA, GPRS, Wi-Fi, Wi-Max & IEEE Standards.

References:

- Security in Computing, Charles P. Pfleeger, Prentice- Hall International, Inc.,
- Applied Cryptography Protocols, Algorithms, and Source Code in C, Bruce Schneier, John Wiley & Sons, Inc., 1995.

- Digital Certificates Applied Internet Security", Jalal Feghhi, Jalli Feghhi and Peter Williams, Addison Wesley Longman.
- Introduction to Cryptography with Coding Theory, Wade Trppe, Lawrence C., Washington, Pearson Education.
- Network Security, Compete Reference, Tata Mc-Graw Hill.
- Fundamental of Computer Security, Piepryzyk, Hardjono, Seberry, Universities Press (India) Pvt. Ltd.

17CSEPCD2: 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.

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

Course Outcomes:

By the end of the course the students will be able to:

CO1. Process, quantize and to perform sampling on given images.

CO2. Transform and filter the digital image for improving the image quality.

CO3. Generate Color images by applying different image characteristics using different color models.

CO4. Compress the digital images by applying different lossless and lossy compression techniques.

CO5. Identify different representations and restoration of digital images.

UNIT I : Introduction and Fundamentals

The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Components of an Image Processing Systems, Image Acquisition, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

UNIT 1I: Image Enhancement in Spatial Domain & Frequency Domian

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 II1: Image Restoration & Compression

A model of The Image Degradation / Restoration Process, Noise Models, Mean Filters, Order-Statistics Filters, Adaptive Filters, Bandreject Filters, Bandpass Filters, Notch Filters, Minimum Mean Square Error (Wiener) Filtering, geometric mean Filter, Inverse Filtering,

Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free compression, Lossy compression, Image compression standards.

UNIT 1V: 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:

1. Rafael C. Gonzalez & Richard E. Woods, “Digital Image Processing”, 2nd edition, Pearson Education, 2004
2. A.K. Jain, “Fundamental of Digital Image Processing”, PHI, 2003
3. Rosefield Kak, “Digital Picture Processing”, 1999

17CSEPCD3: NEURAL NETWORKS

Course Outcomes:

CO1. The role of neural networks in engineering, artificial intelligence, and cognitive modelling. Feed-forward neural networks of increasing complexity, gradient descent learning and extensions, learning and generalization theory

CO2. Have a knowledge of sufficient theoretical background to be able to reason about the behaviour of neural networks.

CO3. Be able to evaluate whether neural networks are appropriate to a particular application.

CO4. Be able to apply neural networks to particular applications, and to know what steps to take to improve performance.

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		
3	-	-	**Marks of Internal:**	**20**
			Examination:	**80**
Duration of Exam: 3 Hrs			**Total Marks:**	**100**

UNIT 1: Neuron Model and Network Architectures

Objective, History, Applications, biological inspiration, Neuron Model, Transfer Functions, Network Architectures.

UNIT 1I: Learning Rules

Perception Learning: Learning Rules, Perceptron Architecture, Perceptron Learning Rule, Training Multiple Neuron Perceptrons. Unsupervised Learning. Supervised Hebbian Learning: The Hebb Rule, Performance Analysis, Application, Variations of Hebbian Learning.

UNIT 1II: 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 1V: Back propagation & Competitive Networks

The Backpropagation Algorithm; Performance Index, Chain Rule, Example, Drawbacks of Backpropagation, Heuristic Modifications; Momentum, Conjugate Gradient, Levenberg-Marquardt Algorithm.

Associative Learning and Competitive Networks: Simple Associative Network, Unsupervised Hebb Rule, Kohonen Rule, Competitive Learning Rule, Self Organizing Feature Maps.

Text/Reference Books:

1. M.T.Hagan, H.B.Demuth and M.Beale, "Neural Network Design" Thomson Learning, 2002

2. Simon Haykin, "Neural Networks – A Comprehensive Foundation," 2nd Edition, Pearson Education, 1999.

17CSEPCD4: ADVANCE TOPICS IN DATABASE SYSTEMS

Course Outcomes:

CO1. Student will be able to know about indexes, various types of multilevel indexes, usage of B and B+ trees

CO2. Know about the concurrency control algorithms and Transaction Life cycle

CO3. Identify various types of Parallel Databases .

CO4. Identify various types of Distributed databases.

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		
3	-	-	**Marks of Internal:**	**20**
			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 1I: Concurrency control

Locking Techniques for Concurrency Control, Concurrency Control Techniques Based on Timestamp Ordering

Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Schedules and Recoverability, Serializability of Schedules.

UNIT 1V: 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

- Database System Concepts by A. Silberschatz, H.F.Korth and S.Sudarshan, 3rd edition, 1997, McGraw-Hill and International Edition.
- Fundamentals of Database Systems by R.Elmasri and S.B.Navathe, 3rd edition.
- An Introduction to Database Systems by C.J.Date, 7th edition, Addison-Wesley, Low Priced Edition, 2000
- Database Management and Design by G.W Hansen, 2nd edition, 1999, Prentice-Hall of India, Eastern Economy Edition.
- Database Management Systems by A,.K.Majumdar and P.Bhattacharyya.5th edition, 1999, Tata McGraw-Hill Publishing.
- Data Management & file Structure by Loomis, 1989, PHI

17CSEPCD5: PERFORMANCE MODELING

Course Outcomes:

CO1. How to calculate and apply measures of location and measures of dispersion -- grouped and ungrouped data cases.

CO2. How to apply discrete and continuous probability distributions to various business problems.

CO3. Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases. Understand the concept of p-values.

CO4. Learn non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.

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: Probability

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

UNIT I1: 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 1II: Networks Simulations

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

UNIT 1V: 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:

- D. Gross and C. Harris, *Fundamentals of Queueing Theory, 3rd Edition,* Wiley, 1998.
- R.B. Cooper, *Introduction to Queueing Theory, 2nd Edition,* North-Holland, 1981.
- L. Kleinrock, *Queueing Systems, Vol. 1: Theory,* Wiley, 1975; *Vol. 2: Computer Applications,* Wiley, 1976.
- R. Nelson, *Probability, Stochastic Processes, and Queueing Theory: The Mathematics of Computer Performance Modelling,* Springer, 1995.
- E. Gelenbe and G. Pujolle, *Introduction to Queueing Networks, 2nd Edition,* Wiley, 1998.
- T.G. Robertazzi, *Computer Networks and Systems: Queueing Theory and Performance Evaluation, 3rd Edition,* Springer, 2000.

17CSEPCD6: DATA WAREHOUSING AND DATA MINING

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		
3	-	-	**Marks of Internal:**	**20**
			Examination:	**80**
Duration of Exam: 3 Hrs			**Total Marks:**	**100**

Course Outcomes:

By the end of the course the students will be able to:

CO1. Compare different types of data and to propose different techniques for its analysis based on the data type.

CO2. Perform the pre-requisite phases: Extract, Transform and Load on the given dataset.

CO3. Prepare the given dataset by applying different pre- processing techniques to clean n transform and reduce the data.

CO4. Implement different data mining techniques on the pre- processed data set for extracting hidden patterns from data.

CO5. Evaluate different techniques and proposed models by using different performance evaluators.

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:

1. Building the Data Warehouse, W.H.Inmon, 3rd Edition, John Wiley & Sons.
2. Developing the Data Warehouse, W.H.Inmon, C.Kelly, John Wiley & Sons.

3. Thomas Connoly, Carolyn Begg-"Database Systems-A practical approach to. Design, Implementation and management" 3rd Edition Pearson Education
4. W.H.Inmon, C.L.Gassey, "Managing the Data Warehouse", John Wiley & Sons.
5. Fayyad, Usama M. et. al., "Advances in knowledge discovery & Data Mining", MIT Press.

17CSEPCD7: SOFTWARE TESTING AND QUALITY ASSURANCE

Course Outcomes:

By the end of the course the students will be able to:

CO1. Knowledge of various Software Testing techniques.

CO2. Use Software Testing Strategies and Metrics for Software testing.

CO3. Knowledge of Object Oriented Testing strategies.

CO4. Knowledge of Software Reliability, and Software Quality Assurance.

CO5. Knowledge of Quality management standards and methods.

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		
3	-	-	**Marks of Internal:**	**20**
			Examination:	**80**
Duration of Exam: 3 Hrs			**Total Marks:**	**100**

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

Object-oriented Testing, Interaction testing, testing of Web Applications, Testing metrics, Testing Paradigms: Scripted testing, Exploratory testing, Test planning, Supporting Technologies: Defect taxonomies, Testing tools and standards, Case studies.

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

Pareto Principle to SQA, Costs of Software Quality, SQA metrics, Audit Review, Walk through, Inspection techniques, SQA plan., Quality standards: SEI-CMM, ISO 9000 series, comparison between SEI CMM and ISO 9000.

References:

1) A Practitioner's Guide to Test Case Design by LEE Copland, Artech House Publishers, Boston - London.
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.
5) Metrics and Models in Software Quality Engineering by Stephen H. Kan , Pearson Education.
6) Handbook of Software Quality Assurance by G. Gordon Sculmeyer, Artech House Publishers, Boston –London

17CSEPCD8: EMBEDDED SYSTEM

Course Outcomes

CO1. To acquire knowledge about microcontrollers embedded processors and their applications.

CO2. Foster ability to understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.

CO3. Foster ability to write the programs for microcontroller.

CO4. Foster ability to understand the role of embedded systems in industry.

CO5. Foster ability to understand the design concept of embedded 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		
3	-	-	**Marks of Internal:**	**20**
			Examination:	**80**
Duration of Exam: 3 Hrs			**Total Marks:**	**100**

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: Arctitecture

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

Motorola MC68H11 Family Architecture Registers, Addressing modes Programs. Interfacing methods parallel I/o interface, Parallel Port interfaces, Memory Interfacing, High Speed I/o Interfacing, Interrupts-interrupt service routine-features of interrupts-Interrupt vector and Priority, timing generation and measurements, Input capture, Output compare, Frequency Measurement, Serial I/o devices RS.232, RS.485. Analog Interfacing, Applications. ARM processors.

UNIT-IV: System Development

Embedded system development, Embedded system evolution trends. Round - Robin, robin with Interrupts, function-One-Scheduling Architecture, Algorithms. Introduction to-assembler-compiler-cross compilers and Integrated Development Environment (IDE). Object Oriented Interfacing, Recursion, Debugging strategies, Simulators.

Text Books:

1. David E Simon, " An embedded software primer ", Pearson education Asia, 2001.
2. John B Peat man " Design with Microcontroller ", Pearson education Asia, 1998.
3. Jonartthan W. Valvano Brooks/cole " Embedded Micro computer Systems. Real time Interfacing ", Thomson learning 2001.

References:

1. Burns, Alan and Wellings, Andy, " Real-Time Systems and Programming Languages", Second Edition. Harlow: Addison-Wesley-Longman, 1997.
2. Raymond J.A. Bhur and Donald L.Bialey, " An Introduction to real time systems: Design to networking with C/C++ ", Prentice Hall Inc. New Jersey, 1999.
3. Grehan Moore, and Cyliax, " Real time Programming: A guide to 32 Bit Embedded Development. Reading " Addison-Wesley-Longman, 1998.
4. Heath, Steve, " Embedded Systems Design ", Newnes 1997

17CSEPCD9: ADVANCED WIRELESS NETWORKS

Course Outcomes:

On completion of this course the student should be able to:

CO1. Apply advanced data communicating methods and networking protocols for wireless and mobile environments.

CO2. Utilize and employ application frameworks for developing mobile applications including under disconnected and weakly connected environment.

CO3. Create web sites suitable for mobile environments.

CO4. Select components and networks for particular application.

CO5. Creatively analyze mobile and wireless networks.

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		
3	-	-	**Examination:**	80
Duration of Exam:	**3 Hrs**		**Total Marks:**	100

UNIT-I : Transmission & Spread Spectrum Techniques

Analog and Digital Data; Transmission fundamentals, Channel Capacity. Transmission Media. Multiplexing. LANs, MANs, and WANs. Switching Techniques; Circuit-Switching. Packet Switching. Asynchronous Transfer Mode- ATM. The Concept of Spread Spectrum. Frequency Hopping Spread Spectrum. Direct Sequence Spread Spectrum. Code-Division Multiple Access. Generation of Spreading Sequences.

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

Radio Specifications. Base band Specification. Link Manager Specification. Logical Link Control and Adaptation Protocol. IEEE 802 Protocol Architecture. IEEE 802.11 Architecture and Services. IEEE 802.11 Medium Access Control. IEEE 802.11x Standards.

UNIT-IV: Wireless Application Protocol (WAP)

The Wireless Application Protocol application environment, wireless application protocol client software, wireless application protocol gateways, implementing enterprise wireless application protocol strategy and Security Issues in Wireless LAN. Wireless network management, GPRS, and VOIP services.

Text/Reference:

1. William Stalling, Wireless Communications and Networks. Prentice Hall 2002
2. Yi-Bing Lin, Imrich Chlamtac, Wireless and Mobile Network Architecture, John Wiley-2001.
3. M. R. Karim, Mohsen Sarraf, W-CDMA and cdma2000 for 3G Mobile Networks, McGraw-Hill Professional, 2002

17CSEPCD10: GENETIC ALGORITHMS

Course Outcomes:

The student will be able to

CO1. Describe the flow of a genetic algorithm and identify its elements.

CO2. Select and apply suitable operators and parameters for a genetic algorithm.

CO3. Analyse the design of a genetic algorithm, and comment its weaknesses and strengths.

CO4. Design genetic algorithms for single and multiple objective optimization problems.

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		
3	-	-	**Examination:**	80
Duration of Exam: 3 Hrs			**Total Marks:**	100

UNIT-I: Genetic Algorithms in Scientific models

A brief history of evolutionary computation, Elements of Genetic Algorithms, A simple genetic algorithm, Applications of genetic algorithms, Evolving computer programs, data analysis & prediction, evolving neural networks, Modeling interaction between learning & evolution, modeling sexual selection, measuring evolutionary activity.

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:

1. David E. Goldberg, "Genetic algorithms insearch, optimization & Machine Learning" Addison Wesley, 1989

References:

1. Melanle Mitchell, "An introduction to genetic algorithms" MIT press, 2000.
2. Masatoshi Sakawa, "Genetic Algorithms & Fuzzy Multiobjective Optimization", Kluwer Academic Publisher, 2001
3. D. Quagliarella, J Periaux, C Poloni & G Winter, "Genetic Algorithms in Engineering & Computer science", John Wiley & Sons, First edition, 1997

17CSEPCD11: GRID COMPUTING

Course Outcomes:

CO1. Thorough grounding in the architecture of the Grid, and exposure to various implementations of the infrastructure.

CO2. Experience in using one particular implementation to construct a Grid-based application.

CO3. Awareness of current open research issues relating to the Grid architecture and infrastructure.

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

Grid Computing & Key Issues – Applications – Other Approaches – Grid

Computing Standards – Pragmatic Course of Investigation.

UNIT-II: Benefits & Status of Technology

Motivations – History of Computing, Communications an Grid Computing – Grid

Prime Time – Suppliers and Vendors – Economic Value- Challenges.

UNIT-III: Architectures

Components of Grid Computing Systems and Architectures: Basic Constituent Elements

– A Functional View – A Physical View – Service View.

UNIT-IV: Standards

Grid Computing Standards – OGSI: Standardization – Architectural Constructs –

Practical View – OGSA/OGSI Service Elements and Layered Model – More

Detailed view.

Text Books:

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

References:

1. Grid Computing – A Practical Guide to Technology and Applications, Ahmar Abbas, Charles Media Publication.

17CSEPCD12: MOBILE COMPUTING

Course Outcomes:

By the end of the course the students will be able to:

CO1. Describe the basic concepts and principles in mobile computing.

CO2. Understand the concept of Wireless LANs, PAN, Mobile Networks, and Sensor Networks.

CO3. Explain the structure and components for Mobile IP and Mobility Management.

CO4. Understand positioning techniques and location-based services and applications and describe the important issues and concerns on security and privacy.

CO5. Apply the fundamental design paradigms and technologies to mobile computing applications.

SYLLABUS

17CSEPCD12: 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.

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

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.
Wireless markup language and wireless markup script: Fundamentals of WML, Writing and formatting text, Navigating between cards and decks, Displaying images, Tables, Using variables, Acquiring User input, Introduction to WML Script, Wml Script control Structures.

Text Books:

1. Yi Bing Li "Wireless and Mobile Network Architecture", John Wiley
2. Wrox "The beginning WML and WML script",Wrox Publication
3. John Schiller

17CSEPCD13: ADVANCED MULTIMEDIA TECHNOLOGY

Course Outcomes:

By the end of the course the students will be able to:

CO1. Design Multimedia by incorporating different components of multimedia effectively.

CO2. Identify different 3D technologies including HDTV, UDTV and Hyper speech.

CO3. Perform dithering on 24 bit color and 8 bit color and 8 bit grey images.

CO4. Compress the photographs and videos by applying lossy as well as loss less techniques.

CO5. Make an animated multimedia by incorporating different enhanced features.

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		
3	-	-	**Marks of Internal:**	**20**
			Examination:	**80**
Duration of Exam: 3 Hrs			**Total Marks:**	**100**

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

Text, Basic sound concepts , MIDI , Speech ,Basic concept of Images, Graphics format ,Basic concepts of Video & animation, Conventional system, Computer based animation, Authoring Tools, Categories of Authoring Tools.

Compression Techniques: Lossless and Lossy compression, Run length coding, Statistical Coding, Transform Coding, JPEG, MPEG, Text compression using static Huffmann technique, Dynamic Huffman Technique, Arithmetic Technique.

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., deformers..

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:

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

Reference Books:

1.Nigel Chapman & Jenny Chapman, “Digital Multimedia”, Wiley Publications, 2000

2.D.P. Mukherjee, “Fundamentals of Computer Graphics and Multimedia”, PHI, 2001

3.Maya manuals.

17CSEPCD14: PARALLEL COMPUTING

Course Outcomes:

By the end of the course the students will be able to:

CO1. Explain the major benefits and limitations of parallel computing.

CO2. Identify and explain the differences between common current parallel architectures.

CO3. Develop parallel solutions for computationally intensive problems on distributed architectures.

CO4. Analyse the performance of a parallel/distributed solutions.

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		
3	-	-	**Examination:**	80
Duration of Exam: 3 Hrs			**Total Marks:**	100

UNIT-I: Parallel and Network Models

The state of computing, multiprocessors and multicomputers, multivector and SIMD computers, architectural development tracks.

Program and Network Properties: Conditions of parallelism, program partitioning and scheduling, program flow mechanisms. System Interconnect Architectures. Network properties and routing, static interconnection networks and dynamic interconnection networks, MPI and PVM architecture.

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

Multiprocessors System Interconnects, Cache Coherence and Synchronization Mechanisms, Vector Processing Principles, Multivector Multiprocessors and Data Flow Architecture.

Text:

1. Kai Hwang “Advanced Computer Architecture”, McGraw Hill.

References:

1. J.P.Hayes “Computer Architecture and Organization”, McGraw Hill.
2. Harvey G. Cragon, “Memory Systems and Pipelined Processors”, Narosa Publication.
3. V. Rajaranam & C.S.R. Murthy, “Parallel Computers”, PHI.
4. R. K. Ghose, Rajan Moona & Phalguni Gupta, “Foundation of Parallel Processing”, Narosa Publications.

5. Kai Hwang and Zu, “Scalable Parallel Computers Architecture”, McGraw Hill.
6. Stalling W., “Computer Organization & Architecture”, PHI.

17CSEPCD15: WEB ENGINEERING

Course Outcomes:

On successful completion of the course students will be able to:

CO1. Develop a web application using server side programming languages and components.

CO2. Apply the web engineering methodologies for Web application development

CO3. Develop a component based web solution and use UML diagrams to describe such a solution.

CO4. Identify and discuss the security risk of a Web application.

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		
3	-	-	**Examination:**	80
Duration of Exam: 3 Hrs			**Total Marks:**	100

UNIT-I: Information Architecture

The role of the Information Architect, Collaboration and Communication, Organizing Information, Organizational Challenges, Organizing Web sites and Intranets, Creating Cohesive Organization Systems Designing Navigation Systems, Types of Navigation systems, Integrated Navigation Elements, Remote Navigation Elements, Designing Elegant Navigation Systems, Searching Systems, Searching your Web Site, Designing the Search Interface, Indexing the Right Stuff, To search or Not To Search, Grouping Content, Conceptual Design, High-Level Architecture Blueprints, Architectural Page Mockups, Design Sketches.

UNIT-II: Dynamic HTML and Web Designing

HTML Basic Concepts, Good Web Design, Process of Web Publishing, Phases of Web Site development, Structure of HTML documents, HTML Elements-Core attributes, Language attributes, Core Events, Block Level Events, Text Level Events, Linking Basics, Linking in HTML, Images and Anchors, Anchor Attributes, Image maps, Semantic Linking Meta Information, Image Preliminaries, Image Download Issues, Image as Buttons, Introduction to Layout: Backgrounds, Colors and Text, Fonts, Layout with Tables. Advanced Layout: Frames and Layers, HTML and other media types. Audio Support in Browsers, Video Support, Other binary Formats. Style Sheets, Positioning with Style sheets. Basic Interactivity and HTML: FORMS, Form Control, New and emerging Form elements.

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

17CSEPCD16: FUZZY LOGIC

Course Outcomes:

At the end of the course, students should:

CO1. Be able to draw a parallelism between crisp set operations and fuzzy set operations through the use of characteristic and membership functions respectively.

CO2. Be able to define fuzzy sets using linguistic words and represent these sets by membership functions.

CO3. Become familiar with fuzzy relations and the properties of these relations.

CO4. Become capable of drawing a distinction between binary logic and fuzzy logic at the conceptual level.

CO5. Become knowledgeable of conditional fuzzy propositions and fuzzy inference 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		
3	**-**	**-**	**Examination:**	**80**
Duration of Exam: 3 Hrs			**Total Marks:**	**100**

UNIT-I: Fuzzy Logic

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

Operations on Fuzzy Sets: Complement, Intersection, Union, Combinations of Operations, Aggregation Operations.

UNIT-II: 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.

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

Application of Fuzzy Logic: Medicine, Economics etc.

Genetic Algorithm: An Overview, GA in problem solving, Implementation of GA

Introduction of Neuro-Fuzzy Systems: Architecture of Neuro Fuzzy Networks.

Text Books:

1. "An Introduction to Neural Networks", Anderson J.A., PHI, 1999.
2. "Introduction to the Theory of Neural Computation", Hertz J. Krogh, R.G. Palmer, Addison-Wesley, California, 1991.
3. "Fuzzy Sets & Fuzzy Logic", G.J. Klir & B. Yuan, PHI, 1995.
4. "An Introduction to Genetic Algorithm", Melanie Mitchell, PHI, 1998.

Reference books:

1. "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.

2. “Neural Networks: Algorithms, Applications and Programming Techniques”, Freeman J.A. & D.M. Skapura, Addison Wesley, Reading, Mass, (1992).

17CSEPCD17: ADVANCED NETWORKING AND PROTOCOLS

Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

CO1. Independently understand basic computer network technology.

CO2. Understand and explain Data Communications System and its components.

CO3. Identify the different types of network topologies and protocols.

CO4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

CO5. Identify the different types of network devices and their functions within a network

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		
3	-	-	**Marks of Internal:**	**20**
			Examination:	**80**
Duration of Exam: 3 Hrs			**Total Marks:**	**100**

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-RTP, video standards) Real time traffic over the internet

References:

1. Behrouz Forouzan, TCP/IP Protocol Suite, Second Edition, Tata McGraw Hill
2. Andrew S Tanenbaum, Computer Networks, Fourth Ecition, Pretice Hall
3. Douglas E. Comer, Internetworking with TCP/IP,Vol. 1, Principles, Protocols and Architecture Fifth Edition, Prentice Hall, 2000, ISBN o-13-018380-6.
4. William Stallings, Data and Computer Communications, Seventh Edition, Pearson Education

17CSEPCD18: INTELLIGENT SYSTEMS

Course Outcomes:

On successful completion of the course students will be able to:

CO1. Understand a range of techniques of intelligent systems across artificial intelligence (AI) and intelligent agents (IA); both from a theoretical and a practical perspective.

CO2. Apply different AI/IA algorithms to solve practical problems.

CO3. Design and build simple intelligent systems based on AI/IA concepts

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		
3	-	-	**Marks of Internal:**	**20**
			Examination:	**80**
Duration of Exam: 3 Hrs			**Total Marks:**	**100**

UNIT-I: Introduction

Intelligent Agents – Agents and environments – Good behavior – The nature of environments – structure of agents – Problem Solving – problem solving agents – example problems – searching for solutions – uniformed search strategies –avoiding repeated states – searching with partial information.

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

First order logic - syntax and semantics – Using first order logic – Knowledge engineering – Inference – propositional versus first order logic – unification and lifting – forward chaining – backward chaining – Resolution – Knowledge representation

UNIT-IV: Learning

Learning from observations – forms of learning – Inductive learning – Learning decision trees – Ensemble learning – Knowledge in learning – Logical formulation of learning – Explanation based learning – Learning using relevant information – Inductive logic programming - Statistical learning methods – Learning with complete data – Learning with hidden variable – EM algorithm – Instance based learning.

Text Books:

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Second Edition, Pearson Education / Prentice Hall of India, 2004.

References:

1. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Second Edition, Tata McGraw Hill, 2003.
3. George F. Luger, “Artificial Intelligence-Structures And Strategies For Complex Problem Solving”, Pearson Education / PHI, 2002.

17CSEPCD19: INFORMATION PROCESSING AND E-COMMERCE

Course Outcomes

Upon successful completion of the course students will be able to:

CO1. Recognize the impact of Information and Communication technologies, especially of the

CO2. Internet in business operations

CO3. Recognize the fundamental principles of e-Business and e-Commerce

CO4. Distinguish the role of Management in the context of e-Business and e-Commerce

CO5. Explain the added value, risks and barriers in the adoption of e-Business and e-Commerce

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		
3	-	-	**Marks of Internal:**	**20**
			Examination:	**80**
Duration of Exam: 3 Hrs			**Total Marks:**	**100**

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

Cloud Computing: Introduction, Iaas, Paas, Saas, Baas, Internetworking between Clouds.
Search Engine Strategies: Functioning, Making information accessible on net,
Getting better rating and preference in search engines

UNIT-IV: E-Commerce

Overview of E-Commerce, Benefits of E-Commerce, Impact of E-Commerce, Applications of E-Commerce, Business Models of E-Commerce. Electronic Payment System: Introduction to Payment System, Online Payment System, Pre-paid and Post-paid Payment System. Security in E-Commerce: Transaction Security, Cryptology, Authentication Protocol, Digital Signature.

References:

1. "Security Technologies for World Wide Web", Rolf Oppliger, Artech House: Inc.
2. "Introduction to Cryptography with Coding Theory", Wade Trappe, Lawrence C. Washington, Pearson Education.
3. "Network Security: Complete Reference", TMH
4. "Compilers: principles, Techniques and Tools" ,Aho, Lam, Ullman, Pearson Education.

5. P.T. Joseph: E-Commerce - A Managerial Perspective, PHI Publication.
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.

17CSEPCD20: INFORMATION HIDING TECHNIQUES

Course outcomes:

After studying this course, the student should be able to:

CO1. Identify some of the factors driving the need for network security

CO2. Identify and classify particular examples of attacks

CO3. Define the terms vulnerability, threat and attack

CO4. Identify physical points of vulnerability in simple networks

CO5. Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack, and explain the characteristics of hybrid 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		
3	-	-	**Marks of Internal:**	**20**
			Examination:	**80**
Duration of Exam: 3 Hrs			**Total Marks:**	**100**

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

Framework for Secret Communication, Security of Steganography System, Information Hiding in Noisy Data, Adaptive versus non-Adaptive Algorithms, Active and Malicious Attackers, Information hiding in Written Text, Steganographic system, Study of Different methods of insertion and retrieval of message using image steganography, Study of histrogram analysis using MATLAB of original image and stego image

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.

17CSEPCD21: DATA MODELING AND DESIGN

Course Outcomes:

After completion of this course the student will be able to

CO1 - model a relational database management system using ER diagram etc;

CO2 - use concepts of object oriented modeling using UML;

CO3 - Learn multi dimensional modelling;

CO4 - Utilize concepts of system analysis and design using XML

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		
3	-	-	**Examination:**	80
Duration of Exam:	**3 Hrs**		**Total Marks:**	100

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

Principles of package design: package cohesion principle, common-reuse principle, common-closure principle, package coupling, stable dependencies 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 multi-dimensional data structures

UNIT-IV: Structured systems analysis

Statement of purpose, context diagram, developing process hierarchy. Use cases

XML, XML schema, XML query

17CSEPCD22: STRUCTURED SYSTEMS ANALYSIS, DESIGN AND TESTING

Course Outcomes:

Upon successful completion of this course, the student will be able to:

CO1. Define and describe the five phases of the system development life cycle.

CO2. Explain at least three ways in which information systems support business requirements.

CO3. Describe how systems analysts interact with users, management, and other information system professionals.

CO4. Develop data flow diagrams and decision tables.

CO5 Perform a feasibility study and Evaluate systems development alternatives.

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		
3	-	-	**Marks of Internal:**	**20**
			Examination:	**80**
Duration of Exam: 3 Hrs			**Total Marks:**	**100**

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.

17CSEPCD23: INFORMATION THEORY AND CODING

Course Outcomes:

Upon completion of this course, students should be able to:

CO1. Calculate the information content of a random variable from its probability distribution.

CO2. Relate the joint, conditional, and marginal entropies of variables in terms of their coupled probabilities.

CO3. Define channel capacities and properties using Shannon's Theorems.

CO4. Construct efficient codes for data on imperfect communication channels.

CO5. Generalize the discrete concepts to continuous signals on continuous channels

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		
3	**-**	**-**	**Examination:**	**80**
Duration of Exam:	**3 Hrs**		**Total Marks:**	**100**

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

17CSEPCD24: FAULT TOLERENT SYSTEM

Course Outcomes:

CO1. To create understanding of the fundamental concepts of fault-tolerance

CO2. To learn basic techniques for achieving fault-tolerance in electronic, communication and software systems

CO3. To develop skills in modelling and evaluating fault-tolerant architectures in terms of reliability, availability and safety

CO4. To gain knowledge in sources of faults and means for their prevention and forecasting

CO5. To understand merits and limitations of fault-tolerant design.

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		
3	-	-	**Marks of Internal:**	**20**
			Examination:	**80**
Duration of Exam:	**3 Hrs**		**Total Marks:**	**100**

Unit 1: Introduction

Top challenges facing the practice of fault-tolerances. Definitions, Dependability, Maintainability, Fault-Error-Failure. Redundancy, Error Detection, Damage Confinement, Error Recovery, Fault Treatment, Passive HW Redundancy, Voting. Fault Prevention -Fault tolerance – anticipated and unanticipated Faults- Test generation for digital systems- Combinational logic.

Unit 1I: Error models

General coding scheme – Parity checking code- arithmetic code – code for computer memories –checking errors in logical operation – communication coding. Error detection techniques: Watchdog processors, Heartbeats, consistency and capability checking, Data audits, Assertions, Control-flow checking, Error control coding. Application: DHCP Fault tolerance: Coding technique-fault tolerant self checking and fail safe circuits-fault tolerance in combinatorial and sequential circuits- synchronous and asynchronous fail safe circuits. Software fault tolerance: Process pairs, Robust data structures, N version programming, Recovery blocks, Replica consistency & reintegration, Multithreaded programs Application: VAX

Unit II1: 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 1V: Practical Systems for Fault Tolerance

Application: Ad-hoc wireless network- Application: NASA Remote Exploration & Experimentation System, Architecture: Fault tolerant computers - general purpose commercial systems-fault tolerant multiprocessor and VLSI based communication architecture. Fault tolerant software: Design-N-version programming recovery block - acceptance tests-fault trees- validation of fault tolerant systems.

REFERENCES

K.K.Pradhan, “Fault Tolerant computing theory and techniques” volume III. P Hall, 1989.
Anderson and Lee, “Fault Tolerant principles and practice” ,PHI 1989.
Parag K. Lala, “Fault Tolerant and Fault Testable, Hardware design” PHI 1985.
LALA, “ Digital systems design using PLD’s “,PHI 1990.
N. N. Biswas, “Logic Design theory”, PHI 1990.
Shem , toy Levei , Ashok K.Agarwala , “Fault Tolerant System design”, Tata MG Hill, 1994 V. Nelson, "Fault-Tolerant Computing: Fundamental Concepts".