

Sri Krishnadevaraya University :: Anantapur
Centre for Distance Education
M.Phil Degree in Computer Science
Paper I : Research Methodology in Computer Science and Technology

Unit- I :

Logic Circuits - Basic Logic Functions, Synthesis of Logic Functions using AND, OR, NOT Gates, Minimization of Logic Expression, Synthesis with NAND and NOR Gates, Flip-Flops, Registers and Shift Registers, Counters, Decoders, Multiplexers, Sequential Circuits. Addressing Methods - Addressing Modes, Assembly Language, Basic I/O operations, Stacks and Queues, Subroutines Processing Unit: Execution of a complete instruction, Hardwired Control, Signed Addition, Subtraction and Multiplication, Arithmetic and Branching Conditions, Integer Division, Floating-Point Numbers

Operating Systems concepts -Computing Environments - Operating System Services, System Calls - Process Scheduling, Cooperating Processes, Inter process Communication, Multithreading Models, Threading Issues, Pthreads CPU Scheduling - Scheduling Algorithms - Critical-Section Problem, Semaphores, Classic Problems of Synchronization. Critical Regions, Monitors Deadlocks - Memory Management - Paging, Segmentation- Segmentation with Paging. Virtual Memory- Demand Paging, Page Replacement, Thrashing

Unit – II :

Abstract Data Types- Linked Lists, Doubly and Circularly Linked Lists, Linked List Implementation - Array Implementation of Stacks. Queue – Array Implementation, Applications of Queues. Graphs & Trees: Topological sort, shortest path algorithms, Minimum spanning trees. Binary Search Trees and their Construction. Hash Function - Open Hashing - Closed Hashing - Rehashing - Extendible Hashing. Selection Sort, Bubble Sort, Insertion Sort,, Shell Sort, Heap Sort, Merge Sort, Quick Sort – Complexities. Linear Search, Binary Search, Searching in Tables.

Unit – III :

Computer Networks And The Internet Principles of Application Layer Protocols, HTTP, FTP, Electronic Mail in the Internet, DNS Transport-Layer Services and Principles, Multiplexing and De-multiplexing Applications, Connectionless Transport, Connection-Oriented Transport - Network Service Models, Routing Principles, Routing algorithms The Data Link Layer-Services, Error Detection and Correction Techniques, Multiple Access Protocols and LAN's, LAN Addresses and ARP, Ethernet-IEEE 802.11 LANs, The Point-to-Point Protocol, Asynchronous Transfer Mode (ATN), X.25 and Frame Relay

Unit – IV :

Conventional Encryption Classical Techniques – Conventional Encryption Modern Techniques: The Block Cipher Principles, The Data Encryption Standard, Differential and Linear Crypt analysis, , Block Cipher Design Principles, Block Cipher Modes of Operation. Conventional Encryption Algorithms - Triple DES, International Data Encryption Algorithm, Blowfish, RC5, CAST, RC2, Traffic Confidentiality, Random Number Generation. Public-Key Cryptography - The RSA Algorithm, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography. Message Authentication And Hash Functions- Digital Signatures, Authentication Protocols, Digital Signature Standard.

Unit – V :

Schema Refinement and Normal Forms : Schema Refinement – Functional dependencies – Reasoning about Functional dependencies – Normal forms – Decompositions – Normalization – other kinds of dependencies - Disk Storage - Disk Technologies and Redundancy Maintenance – buffering of blocks – Heap files and sorted files. Indexing – Primary Indexes, Clustering Indexes, Secondary Indexes, Multilevel Indexes, Indexed Sequential Access - Transaction Management : The Concept of a Transaction – Transactions and Schedules – Concurrent execution of Transactions – Lock-Based Concurrency Control – Introduction to Crash Recovery - Security Issues – Discretionary Access Control – Mandatory access Control – Role-based access control.

Text Books :

1. V.C. Hamacher: *Computer Organization*, 4th Edition, (Tata McGraw Hill)
2. Abraham Silberchartz, Peter Baer Galvin & Greg Gagne: *Operating System Concepts*, 6th Edition, (John Wiley & Sons)
3. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran , “Fundamentals of Computer Algorithms
4. Mark Allen Weiss: *Data Structures & Algorithm Analysis in C++ 2nd Ed.* (Addison-Wesley)
5. James F. Kurose and Kejth W.Ross : *COMPUTER NETWORKING A Top-Down Approach*
6. William Stallings “Cryptography and Network Security “, Pearson Education, 2002,
7. Rahhu Ramakrishnan/ Johannes Gehrke, “ Database Management Systems “ McGraw-Hill International Editions, 2000
8. Remez Elmasri & Shamkanth B. Navathe: *Fundamentals of Database Systems. 4th Ed.* (Pearson Education)

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Paper I : Research Methodology In Computer Science and Technology

Model Question Paper
Answer any FIVE questions. Each question carries 20 marks

UNIT-I

- 1) a) Explain synthesis of logic functions using AND, OR, NOT gates .
- b) Discuss the various system services and system calls provided by the operating system

(OR)

- 2) a) Explain about basic I/O operations with examples
- b) Explain the various virtual memory management techniques with illustrations.

UNIT-II

- 3) a) Explain the linked list representation of a stack. Write an algorithm for stack operations by using linked representation.
- b) Explain the different hashing functions with illustrations.

(OR)

- 4) a) What is a queue? When we call it as a circular queue. Discuss applications of queues.
- b) Write binary search and linear search algorithms. Discuss their applications.

UNIT-III

- 5) a) Explain the principles of application layer protocols.
- b) Describe the different types of routing algorithms. Compare their merits and demerits.

(OR)

- 6) a) Explain the services and principles of Transport layer.
- b) Explain the various error detection and correction techniques with suitable examples

UNIT-IV

- 7) a) Explain the different classical Encryption Techniques.
- b) Explain RSA algorithm with suitable illustration

(OR)

- 8) a) Explain the Block Cipher Design Principles and modes of Operation
- b) Explain the various authentication protocols.

UNIT-V

- 9) a) Give the classifications of database management systems and discuss the process of disk initialization.
- b) Discuss the shadow paging recovery technique.

(OR)

- 10) a) What is functional dependency? Explain reasoning functional dependencies.
- b) Discuss the discretionary and mandatory access control based on granting of privileges.

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Paper –II(A) : COMPUTER NETWORKS

UNIT – I

Network Hardware – MAN – WAN – Wireless Network – Network Software: Design issues for the Layers – Interfaces and Services – Service Primitives – Relationship of Services to Protocols – Reference Models: The OSI Reference Model – TCP/IP Reference Model - Examples Networks – The ARPANET – NSFNET – Internet – Transmission Media – Wireless Transmission – Narrow Band ISDN – Broad Band ISDN and ATM.

UNIT – II

Data Link Layer Design Issues – Service Provided to Network Layer – Framing – Error Control – Flow Control – Error Correcting and Detection codes – Elementary Data Link Protocols – Sliding Window Protocols - Example Data Link Protocols – Medium Access Sub Layer – The Channel Allocation Problem – Multiple Access Protocols – IEEE Standard 802 for LANS and MANS – Bridges.

UNIT – III

Data Link Layer Design Issues – Routing Algorithms – Service Provided to Transport Layer – Comparison of Virtual Circuit and Datagram Subnet – Routing Algorithms – Congestion Control Algorithms – Congestion Prevention Policies – Congestion Control in Virtual Circuit Subnets – Couke Packets – Multicasting – Internet Working – The Network Layer in the Internet – Internet, ATM Network.

UNIT – IV

Transport Layer – Services Provided to the Upper Layers – Quality of Service – Service Primitives – Elements of Transport Protocols – The Internet Transport Protocols (TCP and UDP) – Performance Issues – Measuring Network Performance – The Application Layer - Network Security – Secret Key Algorithms – Public Key Algorithms – Authentication Protocols – Digital Signature – DNS - SNMP – Electronic Mail – WWW – Multimedia.

UNIT – V

Network Security Applications: Authentication Applications – Electronic Mail Security – IP Security – WEB Security – System Security: Intruders- Firewalls

BOOKS:

1. Computer Networks – Third Edition **Andrew S. Tanenbaum** – Prentice Hall of India
2. Cryptography and Network Security, Principles and Practices- Fourth Edition, **William Stallings**- Pearson Education

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PAPER II-A : COMPUTER NETWORKS

Model Question paper

Time : 3 Hours

Max.Marks : 100

*Answer any FIVE Questions .One From Each Unit.
Each Question carries 20 marks.*

UNIT :1

- 1 (a) With suitable diagram, explain the working of OSI reference model
(b) How ARPA NET & NSFNET act as the best example networks.

(or)

2. (a) Describe the various transmission media in computer communication.
(b) Describe Circuit Switching and Packet Switching.

UNIT: 2

3. (a) What are the services provided by the data link layer.
(b) Discuss the framing methods used in the systems in the data link layer.
If the bit string is 01111001111101111110 is bit stuffed , What is the output.

(or)

4. (a) Find the CRC for a frame 1010001101 & $G(x)=X^5+X^4+X^2+1$.
(b) How can you construct Hamming code for single error detection.

UNIT :3

- 5 (a) Explain the Sliding window protocols.
(b)Write the explanatory notes on OSPF and BGP.

(or)

6. (a) What is routing ? How are routing technologies classified.
(b) Explain Token Bucket and Leaky Bucket Algorithms.

UNIT :4

7. (a) Explain the design issues of the transport layer.
(b) Discuss briefly TCP Protocols

(or)

8. Write about Secret key and public key algorithms.

UNIT :5

9. (a).Explain Web Security, System Security.
(b) With respect to email explain a)User Agent (b) Message transfer agent.

(or)

10. Write a note on (a) Firewalls (b) Intruders c) IP security..

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SYLLABUS
PAPER II-B :- IMAGE PROCESSING.

UNIT – I ::

Introduction :- The Origins of Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Digital Image Fundamentals – Elements of Visual Perception – Structure of the Human Eye, Image Formation in the Eye, Light and the electromagnetic Spectrum – Image Sensing and Acquisition, Image acquisition Using a Single Sensor, A Simple Image Formation Model, Image Sampling and Quantization – Basic Concepts in Sampling and Quantization, Representing Digital Images, Basic Relationships Between Pixels – Neighbors of a Pixel, Adjacency, Connectivity, Regions, and Boundaries, Distance Measures, Linear and Nonlinear Operations.

UNIT - II

Image Enhancement in the Spatial Domain – Basic Gray Level Transformations, Image Negatives, Log Transformations, Histogram Processing – Histogram Equalization, Histogram matching (Specification), Enhancement Using Arithmetic / Logic Operations - Image Subtraction, Basic of Spatial Filtering, Smoothing Spatial Filters – Smoothing linear Filters, Sharpening Spatial Filters – Use of Second Derivatives for Enhancement the Laplacian, Combining Spatial Enhancement Methods, Introduction to the Fourier Transform and the Frequency Domain – The One – Dimensional Fourier Transform and its inverse, The Two-Dimensional DFT and its Inverse, Filtering in the Frequency Domain, Smoothing Frequency-Domain Filters – Ideal Lowpass Filters, Butterworth Lowpass Filters, Sharpening Frequency Domain Filters – Ideal Highpass Filters – Butterworth Highpass Filters, Homomorphic Filtering, Implementation.

UNIT - III

Image Restoration – A Model of the Image degradation/Restoration Process, Noise Models – Spatial and Frequency Properties of Noise, Restoration in the presence of Noise Only-Spatial Filtering – Mean Filters, Periodic Noise Reduction by Frequency Domain Filtering – Band reject Filters, Band Pass Filters, Inverse Filtering, Geometric Transformations – Gray-Level Interpolation, Color Image Processing – Color Fundamentals, Color Models – The RGB Color Model, Pseudo color Image Processing – Intensity Slicing, Basic of Full-Color Image Processing – Formulation, Color Complements, Histogram Processing.

UNIT - IV

Wavelets and Multiresolution Processing – Background – Image Pyramids, Subband Coding, Multiresolution Expansions – Wavelet Functions, Wavelet Transforms in One Dimension – The Wavelet Series Expansions The Discrete Wavelet Transform, The Continuous Wavelet Transform, Wavelet Transforms in Two Dimensions, Image Compression – Fundamentals – Coding Redundancy, Inter pixel Redundancy, Fidelity Criteria, Image Compression Models – The Source Encoder and Decoder, The Channel Encoder and Decoder, Fundamentals Coding Theorems, Variable-Length Coding, Huffman Coding, Run Length Coding, Lossy Compression – Transform Coding,

UNIT - V

Morphological Image Processing – Preliminaries, Dilation and Erosion, Opening and Closing, The Hit-or-Miss Transformation, Basic Morphological Algorithms – Boundary Extraction, Region Filling, Convex Hull, Thinning, Extension to Gray-Scale Images – Dilation, Erosion, Image Segmentation – Detection of Discontinuities – Point Detection, Line Detection, Edge Detection, Thresholding - Foundation, Basic Adaptive Thresholding, Optimal Global and Adaptive Thresholding, Region-Based Segmentation – Basic Formulation, Region Growing, Region Splitting and Merging,

Reference:-

DIGITAL IMAGE PROCESSING – Second Edition – by Rafael C. GONZALEZ and Richard

E.

WOODS

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PAPER :- II – B : IMAGE PROCESSING.

Model Question paper

Time :: 3 Hours

Max Marks :: 100

Answer any five questions one from each unit.
Each Question carries 20 marks.

UNIT - I

1. (a) Explain the fundamental steps in digital Image processing.
(b) Explain briefly about the components of an Image processing system.
(or)
2. (a) Discuss about the Elements of Visual perception.
(b) Explain features of sampling and quantization.

UNIT - II

3. (a) Explain the gray level transformation.
(b) Describe the enhancement techniques.
(or)
4. (a) Explain the Fourier and Discrete Fourier transform.
(b) Explain the smoothing and sharpening filters.

UNIT - III

5. Explain about Image restoration process.
(or)

6. Explain about color models.

UNIT - IV

7. Explain about wavelet Transforms in one dimension.
(or)

8. Explain the Image compression models.

UNIT - V

9. Explain the features of dilation and Erosion.
(or)
10. Explain the Region Based segmentation.

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Paper –II(C) : DATA MINING

UNIT – 1

Introduction to Data Mining – Importance of Data Mining – Data Warehouses – Relational databases – Transactional databases – Applications of data mining – data mining functionalities – data mining patterns - - data mining primitives – Integrations of Data Mining and Data Warehouse – Data Mining issues – Data Preprocessing – descriptive data summarization – Data cleaning – Data Integration – and Transformation – Data Reduction – Data Mining – Tasks – Social Implications of Data Mining – Data Mining from a database prospective.

UNIT - II

Data warehouses and OLAP Technology – overview of data were house- Multidimensional Data Model - Star-Snow flake Models- Measures – OLAP operations – Data Warehouse Architecture –Three-Tier Data Warehouse Architecture - Data Warehouse Utilities – Types of OLAP – Data Warehouse implement – Differences of Data Warehouse and Data Mining Efficient Methods for Data cube computation – di

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Paper – II(C) : DATA MINING

MODEL PAPER

Time : 3.00 hrs

Max Marks: 100

Answer All Questions. Each Question Carries 20 Marks

Unit – I

- 1(a) What is Data Mining? How does Datawarehouse different from Database.
(b) Describe the Data Mining Patterns.

(or)

- 2(a) Differentiate between Data Mining and Data Warehouse? What are its applications?
(b) What do you mean Data Cleaning? Discuss about Data Mining issues.

Unit – II

- 3(a) Describe the Data Warehouse architecture with neat diagram.
(b) Explain Star schema model with an example.

(or)

- 4(a) Distinguish between OLAP and OLTP.
(b) What are Data Mining utilities? Explain in detail.

Unit – III

- 5(a) Discuss about Data Mining Techniques.
(b) Describe about Market Basket Analysis(MBA)

(or)

- 6(a) What is Item Set? Explain about Frequent Item Sets.
(b) Write Apriori Algorithm with suitable example

Unit – IV

- 7(a) Illustrate the issues of Classification and Prediction.
(b) Describe about Cluster Analysis

(or)

- 8(a) Explain different Methods of Partitioning.
(b) Describe k-mean Clustering.

Unit – V

- 9(a) What do you understand about Web Mining? Explain.
(b) Define Spatial Mining? Explain its Primitives.

(or)

- 10(a) Distinguish between Text Mining and Temporal Mining. What are its advantages?
(b) Explain the Applications and Trends of Data Mining?

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Paper – II (D) :ARTIFICIAL INTELLIGENCE

UNIT – I

Introduction to Artificial Intelligence – Importance of Artificial Intelligence – Early work in AI – AI and related fields. Knowledge – Concepts – Importance of Knowledge – Knowledge based systems – Representation of knowledge – Knowledge organization – Knowledge Manipulation – Acquisition of Knowledge – Problem – Problem space and search – Problem characteristics – Production System – Production system characteristics – Heuristic Search Techniques – General-and –Test – Hill Climbing Best-First Search – Problem Reduction – Mean-Ends Analysis.

UNIT – II

Knowledge Representation – Formalized Symbolic Logics - Syntax and semantic for Propositional Logic – Syntax and Semantics for FOPL – Properties of Wffs – Conversion of Casual Form Inference Rules – Representations using Rules – Dealing with inconsistencies and uncertainties – Predicate Completion and Circumscription – Modal and Temporal Logics - Fuzzy Logic and Natural Language Computations – Probabilistic Reasoning – Bayesian Probabilistic Inference – Dempster Shafer Theory – Ad-Hoc Methods – Heuristic reasoning Methods. Structured Knowledge – Graphs – Frames and Related Structures – Associative Networks – Frame Structures – Conceptual Dependencies and Scripts – Object Oriented Representation.

UNIT – III

Knowledge Organization and Manipulation – Search and Control Strategies – Examples of Search Problems – Uniformed or Blind Search – Informed And-Or-Graphs – Matching Techniques – Structures Used in Matching – Measures of Matching – Patterns – Partial Matching - Fuzzy matching Algorithms – RETE Matching Algorithm - Knowledge Organization and Management – Indexing and Retrieval Techniques – Integrating Knowledge in Memory – Memory Organization System.

UNIT - IV

Perception – Communication and Expert Systems – Natural Language Processing – Overview of Linguistics – Basic Parsing Techniques – Natural Language Generation – Pattern Recognition – Recognition and Classification Process – Recognition and understanding Speech – Visual Image Understanding – Image Transformation Low – Level, Intermediate and High Level Image Processing – Vision System Architecture – Expert System Architecture – Rule based and Nonproduction System Architectures Dealing with uncertainty – Knowledge Validation – Knowledge System Building Tools.

UNIT – V

Knowledge Acquisition – General Concepts – Types of Learning - General Learning Models – Performance Measures – Early wok in Machine Learning – Perceptrons - Learning Automata – Genetic Algorithms – Learning by Induction – Generalization and Specialization – Inductive Bias – Examples of an Inductive Learner - ID3 System – LEX System – INDUCE System Learning Structure Concepts – Analogical and Explanation Based Learning – Analogical Reasoning and Learning – Examples – Explanation Based Learning.

Reference Books

1. Introduction to Artificial Intelligence and Expert Systems – **DAN W. PATTERSON PHI**
2. Artificial Intelligence – **Elaine Rich - TMH**

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Paper – II(D) – Artificial Intelligence

MODEL PAPER

Time : 3.00 hrs

Max Marks: 100

Answer All Questions Each Question Carries 20 Marks

Unit – I

- 1(a) Define and describe the difference between knowledge, belief, hypothesis and data
(b) What is AI?.List and explain the applications of Artificial Intelligence.

(or)

- 2(a) Differentiate between declarative and procedural knowledge with suitable
(c) Describe the heuristic search techniques. Compare their merits and demerits.

Unit – II

- 3(a) Explain the syntax and semantics for propositional logic with suitable illustrations.
(c) Describe conceptual dependencies and scripts with examples.

(or)

- 4(a) Explain Associative networks with an example.
(c) What are Modal and Temporal logics ? Explain about reasoning with Fuzzy logic with an example

Unit – III

- 5(a) Explain about the Uninformed and Informed Search methods and compare their merits and demerits.
(c) Explain the RETE matching algorithm with a typical illustration.

(or)

- 6(a) Explain the different indexing and retrieval techniques.
(c) Describe the Memory Organization systems.

Unit – IV

- 7(a) List and explain the levels of knowledge used in Language understanding.
(c) Explain the basic parsing techniques.

(or)

- 8(a) Explain Chomsky hierarchy of generative grammars.
(c) What are Expert systems? Describe the importance of Expert systems with possible areas of applications.

Unit – V

- 9(a) What are the types of Learning? Explain the general learning model and performance measures of learning methods..

- (c) What are perceptrons? Explain about the learning automata..

(or)

- 10(a) What are Intelligent Editors? Explain about the genetic algorithms.
(c) What are the features of LEX System. Explain about analogical reasoning and learning.