

RAMAKRISHNA MISSION VIDYAMANDIRA
(Residential Autonomous College under University of Calcutta)

Syllabus For B.Sc. Computer Science Honours

For the session 2010-13

Semester - VI (January - June)

Paper – *CMSA601 (Theory)*

MARKS: 100

Computer Graphics & Multimedia: (Marks 40)

Introduction: Co-ordinate System, Information Handling Software, Graphics Software, Area of Application.

Translation, Rotation, Scaling, Matrix Representation, Homogeneous Co-ordinate System, 2D & 3D Transformations, Lines, Curves (Spline, Bspline and Circle) and their presentations, Fill Algorithm (Boundary and Region Fill) Composite Transformation, Inverse Transformation, Computer Art, Animation, Morphing, Projection & Clipping.

Special Paper (Any Two): (Marks 30+30=60)

i) Image Processing:

Image acquisition and digital image representation – sampling, quantization, pixel, gray level values, Histogram, Colour representation using RGB model, CMYK model. Image transformations in spatial domain – contrast enhancement, brightness enhancement (Log transform, Gamma correction etc.), gray scale conversion, Histogram equalization, image averaging – use in smoothing ; Fourier transformation , Basic concept of Filter. Image Compression – Lossy vs Lossless, few lossy compression techniques – RLE Applications of image processing. Case study of Standard Image Format: Bitmap, JPEG.

ii) Cryptography:

Foundations of Cryptography and Security. Principles of Security: Confidentiality, Authentication, Integrity, Non Repudiation.

Types of Attacks:

Active Attack, Passive Attack, Sniffing, Spoofing, Phishing, DNS Spoofing.

Cryptographic Techniques:

Substitution Techniques: Caesar Cipher, Modified Caesar Cipher, Mono-alphabetic Cipher, Homophonic Substitution Cipher, Polygram Substitution Cipher, Poly-alphabetic Substitution Cipher.

Transposition Techniques:

Rail Fence Technique, Simple Columnar. Vernam Cipher

Computer Based Symmetric Key Cryptographic Algorithms:

Symmetric Key Cryptography and Problem of Key Distribution: Deffie-Hellman Key Exchange Algorithm.

Steganography: Basic Concepts.

Algorithm Types:

Stream Cipher and Block Cipher - Data Encryption Standard (DES), International Data Encryption Algorithm (IDEA). Concepts of Confusion and Diffusion.

Algorithm Modes:

Electronic Code Book, Cipher Block Chaining, Cipher Feedback, Output Feedback,

Computer Based Asymmetric Key Cryptographic Algorithms:

RSA Algorithm, Digital Envelop, Digital Signatures, Message Digest (MD5), SHA-1 basic concept.

Digital Certificates: Basic Concepts.

iii) VLSI Design:

Introduction to VLSI Design and Overview of VLSI technology, Different processes for fabrication, Basic electrical properties of MOS, Discussion of PASS transistor and Inverter, MOS layers.

Design style ,Design Rules, Basic circuit concept, Scaling MOS circuits, Subsystem design and layout, Memory resistors and aspects of system timing, Some CMOS projects, Introduction to VHDL, Field programmable gate arrays.

iv) Artificial Intelligence:

General issues and overview of AI, Agents.

Problem Solving by Search:

State Space Search:

Uninformed Search: BFS, DFS, Bi-directional Search.

Informed Search: Heuristic Search Techniques, Greedy Best First Search, A* Search, Hill Climbing algorithm.

Game Playing:

Adversarial Search, Min-max algorithm, Alpha-Beta pruning.
Constraint Satisfaction Problem (Basic Ideas).

Automated Reasoning:

Proposition and First Order Logic, Inference and Deduction, Resolution refutation, Answer Extraction.

Knowledge Based Systems, Logic Programming and Constrained Logic Programming: AI Programming Language (PROLOG).

Introduction to Machine Learning:

Supervised and Unsupervised learning.

Neural Network: Preliminary ideas.

Fuzzy Logic: Difference between fuzzy and crisp set, α -cut, fuzzy set operations.

Paper – *CMSA602 (Practical)*

MARKS: 100

Network Programming Lab: (Marks 25)

Fundamental ideas on client-server programming using socket.

Web Programming Lab: (Marks 25)

ASP,JSP,PHP-Basic web applications.

Project: (Marks 50)

References:

1. Hearn Baker, "Computer Graphics".
 2. Malay K Pakhira, "Computer Graphics and Multimedia".
 3. Malay K Pakhira, "Digital Image Processing and Pattern Recognition "
 4. Milan Sonka, V. Hlavac, R. Boyle, "Image Processing, Analysis and Machine Vision"
 5. William K. Pratt, "Digital Image Processing"
 6. Atul Kahate "Cryptography and Network Security"
 7. Douglas R Stinson "Cryptography: Theory and Practice, Third Edition"
 8. A Kahate and Godbole "Web Technologies"
 9. William Stallings, "Network Security Essentials"
 10. Gollmann, Dieter, "Computer Security"
 11. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management"
 12. Pearlman and Kaufman "Private Communication in a Public World"
 13. Pucknell D.A and Eshraghian K "Basic VLSI Design"
 14. Michael John Sebastian Smith "Application-Specific Integrated Circuits"
 15. Keshab K. Parhi - VLSI Digital Signal Processing Systems: Design and Implementation
 16. Jayaram Bhasker - A VHDL Primer (3rd Edition)
 17. N.Sherwani, Kluwer - "Algorithm for VLSI Design & Automation".
 18. Elaine Rich and Kevin Knight: Artificial Intelligence
 19. Dan W. Patterson: Introduction to Artificial Intelligence and Expert Systems
 20. S. Russel and P. Norvig, "Artificial Intelligence, A modern Approach"
 21. Internetworking With TCP/IP: Client-Server Programming And Applications (BSD Socket Version With ANSI C) by Comer Douglas E., Stevens David L. PHI.
 22. Unix Network Programming (Vol 1, 2 and 3) by W. Richard Stevens. PHI.
 23. PHP: The Complete Reference by Steven Holzner. Tata Mcgraw Hill.
 24. JDBC, Servlets, And JSP Black Book. Dreamtech Press
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