RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. SIXTH SEMESTER EXAMINATION, MAY-JUNE 2013

THIRD YEAR

Date : 6/5/2013 **COMPUTER SCIENCE (Honours)**

Time : 11 am – 3 pm Paper : VII Full Marks : 100

[Use separate Answer Books for each group]

Group – A

Answer **any four** questions :

1. a) Consider a raster system with a resolution of 1280×1024. What will be size of frame buffer in bytes to store 24 bits per pixel? [3]
   b) Consider a raster system with a resolution of 640×480. How many pixels can be accessed per second in this system by a display controller that refreshes the screen at a rate of 60 frames per second? [3]
   c) Explain the working principle of a CRT. [4]

2. a) Write down the Bresenham's Line drawing algorithm for $|m| < 1$. [3]
   b) Demonstrate the midpoint circle algorithm for a circle of radius r = 10 with centre at the origin to determine positions in the first quadrant for x = 0 to x = y. [4]
   c) Let the Bezier blending functions $BEZ_{K,n}(u)$ are the Bernstein polynomials where $0 \leq u \leq 1$ and $BEZ_{K,n}(u) = 0$ for K > n or K < 0. Prove that
      i) $BEZ_{K,n}(u) = (1-u)BEZ_{K,n-1}(u) + uBEZ_{K-1,n-1}(u)$, $n > K \leq 1$
      ii) $\sum_{K=0}^{n} BEZ_{K,n}(u) = 1$ [3]

3. a) A y-direction shear of amount ½, relative to the line $x_{ref} = -1$ is applied on the square with vertices (0,0), (1,0), (1,1), (1,0). What will be the new position of the vertices (0,0) and (1,1)? [3]
   b) Show that two successive 2D reflections respectively about two lines passing through the co-ordinate origin are equivalent to a single rotation about the co-ordinate origin. [4]
   c) Distinguish between parallel and perspective projection. Also distinguish between oblique and orthographic parallel projection. [3]

4. a) Rotate an object through an angle of 45 degree. The axis of rotation is given by the direction vector (1,1,1) passing through (1,0,0). Determine the transformation matrix. [6]
   b) Let origin be the centre of projection. Find out the perspective projection when the projection plane passed through the point P(2,3,–1) and has normal vector (–1,1,–1). [4]

5. State whether the following statements are true or false. Justify your answer. [4×2½]
   a) Phosphorus with high persistence are better than phosphorous with low persistence for static, complex drawing.
   b) A point determined as inside point using winding number rule can be an outside point using odd parity rule.
   c) Liang-Barsky algorithm is more efficient than Cohen-Sutherland algorithm for 2D line clipping.
   d) A perspective projection preserves relative proportions.

6. a) Describe about the different steps for designing an animation sequence. [5]
   b) Find a single transformation matrix to scale a unit square placed at the origin along its diagonal [(0,0) to (1,1)] by a scale factor of 2. [5]

7. a) What do you mean by a clipping operation? [2]
   b) Find out the transformation matrix for rotating a point in 3D plane with respect to Z-axis. [3]
   c) What is inverse transformation? [2]
   d) Name any three animation software. [3]

Group – B

8. Answer **any two** questions :
   a) Name any three security attacks which can affect integrity of data. Briefly discuss any one of them. [3+2]

b) Briefly explain known-plaintext type of cryptanalysis attack. [5]
c) Discuss the main attack which can affect the security of Diffie-Hellman protocol. [5]
d) Write a short note on DNS spoofing. [5]

Answer **any two** questions from 9-12 :

9. a) Suggest a method which combines the features of both symmetric & asymmetric Key cryptography. Explain its working. [7]
b) Briefly differentiate between the key features of MDS & SHA-1 message digest algorithm. [3]

10. a) IDEA is perceived as one of the strongest cryptographic algorithms. Elaborate. [3]
b) Consider an RSA encryption scheme where P=5, q=11 and e=7.
i) What is the value of d?
ii) What is the plain text after decrypting the message "RJR" (assuming each plain text character is encoded individually)
Note : The value of the characters in message is same as their positions in English alphabet. e.g. A = 1, B = 2, C = 3, ... so on. [7]

11. a) What are the contents of a digital certificate? [6]
b) Discuss the cryptanalysis of any Caesar Cipher technique. [4]

12. a) What do you mean by a transposition cipher? [2]
b) Find the encrypted text corresponding to the plain text "SECURITY ATTACK" using rail fence cipher technique. [4]
c) Explain the components of a modern block cipher. [4]

Group – C

13. Answer **any five** questions : [5×2]
a) Define rational agent.
b) What is the role of heuristics in informed search?
c) What are the drawbacks of hill Climbing search algorithm?
d) Define Tautology with proper example.
e) What is the difference between a predicate and a function in FOL?
f) What is Skolemization?
g) Define Supervised and Unsuervised learning.
h) What are the major components of Expert Systems?

Answer **any two** questions from 14-17 :

14. a) Write down the algorithm for A* search technique. What is the form of the heuristic estimation function for A* search technique? [5+2]
b) Derive the time complexity of DFS technique. [3]

15. a) Write a PROLOG program that takes a list as its argument and find the maximum and minimum number form it. [5]
b) What do you mean by Entailment? Give proper example. [3]
c) What is a closed world assumption? [2]

16. a) Build variables, domains and constraints for the following CSP problem :
Place 8 queens on a chessboard such that no two queens attack each other. [4]
b) What is the difference between chronological backtracking and intelligent backtracking? Explain with proper example. [3]
c) How does Alpha-Beta pruning improve efficiency of Minimax algorithm? [3]

17. a) Draw and explain the basic components of an Artificial Neural Network. [3]
b) Define Phonology and Morphology in context of Natural language Processing. [4]
c) Compare between Reactive robot and Deliverative robot. [3]