RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SIXTH SEMESTER EXAMINATION, MAY 2016

THIRD YEAR [BATCH 2013-16]

Date : 04/05/2016 **COMPUTER SCIENCE (Honours)**

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

[Use a separate Answer Book for each group]

Group – A

1. Answer **any two** from a, b, c (2 × 2·5)

   Define the following terms :-

   a) Persistence, bitmap, pixmap (1·5 + 0·5 + 0·5)

   b) Morphing (2·5)

   c) Raster Scan CRT (2·5)

OR

2. Answer **any two** from a, b, c (2 × 2·5)

   a) Using DDA algorithm draw a line from the point (9, 2) to (3, 4). Find out all the points in between the two given points. (2·5)

   b) Mention the different steps in sequence to design an animation. (2·5)

   c) What do you mean by cavalier projection and cabinet projection? (2·5)

Answer **any two** questions from question nos. 3, 4, 5 & 6 : (2 × 10)

3. a) Write the operating characteristic of the plasma panel display technology. (3)

   b) State whether the following statements are true or false. Justify your answer. (2 × 2)

      i) Raster scanning is better than random scanning technique used in display.

      ii) Phosphorus with high persistence are better than phosphorus with low persistence for static, complex drawing.

   c) Give two examples of virtual-reality system. (1)

   d) Let $BEZ_{k,n}$ be the K^{th} Bernstein polynomial, then prove that

   $$BEZ_{k,n}(u) = (1-u)\,BEZ_{k,n-1}(u) + u\,BEZ_{k-1,n-1}(u) \text{ for } n > k \geq 1.$$ (2)

4. a) Indicate which raster location would be chosen by Bresenham's algorithm, when scan converting a line from pixel co-ordinate (1, 1) to pixel co-ordinate (8, 5). (4)

   b) Locate the new position of a triangle with vertices (5, 4), (8, 3), (8, 8) after its rotation by 90^0 in the clockwise direction about its centroid. (4)

   c) A point determined as inside point using winding number rule can be an outside point using odd parity rule. State whether it is true or false. Explain with example. (2)

5. a) Evaluate the rotation transformation matrix, for rotation of three-dimensional position, in counter clockwise of amount θ degree, about an rotation axis not parallel to any of three co-ordinate axes and the axis is passing through points P_1 (x_1, y_1, z_1) and P_2 (x_2, y_2, z_2). (7)

b) Let origin be the centre of projection. Find out the perspective projection when the projection plane passes through the point P (1, 2, 3) and has normal vector (1, -1, 1). (3)

6. a) Construct the B-Spline curve of order 3 and with 4 polygon vertices A (1, 1), B (2, 3), C (4, 3) and D (6, 4). (5)

b) Explain the steps of JPEG compression. (3)

c) What is MIDI file? (2)

Group – B

7. What do you mean by resolver? Explain recursive resolution and iterative resolution in brief. (2+1·5+1·5)

OR

8. For the following string of bits draw the digital signal of (2·5+2·5)

i) NRZ

ii) RZ

10110101100

Answer **any four** questions from question nos. 9, 10, 11, 12, 13 & 14 : (4 × 10)

9. a) Differentiate between internet and Internet. (1)

b) Write one advantage and one disadvantage of mesh topology. (1 + 1)

c) Explain the responsibilities of presentation layer. (3)

d) What are the advantages of optical fiber cable? (3)

e) Why ADSL technology is called asymmetric? (1)

10. a) Write down two advantages of satellite communication. What do you mean by footprint? (2 + 1)

b) Differentiate between physical address, logical address and port address. (3)

c) "A delivery in network layer always involves one direct delivery but zero or more indirect deliveries" – Justify. (3)

d) Define : flow control. (1)

11. a) What is signal attenuation? (2)

b) Write a short note on IPV6 addressing. (4)

c) "Internet is a connectionless network" – Justify. (2)

d) Can 190.16.56.0 be the beginning address of a block containing 1024 addresses? Explain. (2)

12. a) What is the difference between direct broadcast address and limited broadcast address? (1)

b) An organization is granted the block 16·0·0·0/8. The administrator wants to create 500 fixed length subnets.

i) Find the subnet mask. (1)

ii) Find the number of addresses in each subnet. (1)

iii) Find the first and last addresses in subnet 1. (1 + 1)

iv) Find the first and last addresses in subnet 500. (1 + 1)

c) Explain general architecture of e-mail mentioning the protocol(s) used in each part. (3)

13. a) Find out the CRC for the following digital data 10110100101 with the predefined divisor 1011. (3)

b) A noiseless channel with bandwidth 4000Hz is transmitting a signal with two signal levels. What is the maximum bit rate? (2)

c) Give the difference between TCP & UDP. (2)

d) What is QAM? Explain with an example. (1 + 2)

14. a) Write down the main difference between FDM and TDM. (1)

b) Differentiate between different types of web documents with example. (2)

c) How a bridge can be used to increase the bandwidth of Ethernet network without increasing it physically? (2)

d) Explain addressing mechanism of IEEE 802.11 in brief. (4)

e) What is the significance of H-flag present in a routing table? (1)

Group – C

Attempt either Unit I or Unit II

Unit I (Cryptography)

Answer **any three** questions of the following : (3 × 10)

15. a) Explain the meet in the middle attack for DES algorithm. (3)

b) Explain the strength of DES algorithm. (3)

c) Explain the challenge – response authentication technique. (3)

d) What is S-Box? (1)

16. a) i) Alice uses Bob's RSA public key (e = 7, n =143) to send the plain text P = 8 encrypted as cipher text C = 57. Show how Eve can use the chosen cipher text attack if she has access to Bob's computer to find the plain text. (6)

ii) In RSA, what is the problem in choosing 2 as the public key e? (2)

b) Suggest a technique where authentication can be ensured at the loss of confidentiality. (2)

17. a) What do you mean by zero knowledge protocol? (2)

b) In the Fiat shamir protocol, what is the probability that a dishonest claimant coorectly responds to the challenge 20 times in a row? (2)

c) Give the difference between symmetic & Asymmetic key cryptography. (3)

d) Explain the concept of Digital Envelop. (3)

18. a) Explain the square & multiply algorithm to find $y = a^x \bmod n$ where a, $x<n$ are given. Also derive its complexity. (5 + 2)

b) Justify whether Diffie-Hellman key exchange algorithm is suitable for encryption-decryption. (3)

19. a) Find out whether 14 or 16 is a QR in $Z_{23}*$. (2)

b) Explain the key-generation process for each round in the DES algorithm. Why 0000000FFFFFFF is a weak key of DES algorithm? (4 + 1)

c) Why Field is the most appropriate algebraic structure in cryptographic sense? State the advantage of GF(2^n). (1·5 + 1·5)

Unit II (Image Processing)

Answer **any three** questions of the following : (3 × 10)

20. a) Describe the image acquisition and digital image representation technique. (6)
    b) Why conversion from analog to digital signal is necessary in order to digitize the image? (2)
    c) Define Bit map. (2)
21. a) Describe any two brightness / contrast enhancement methodologies. (6)
    b) Write down the formula for converting a RGB image to its equivalent Gray scale image. (2)
    c) What is the importance of Histogram Equalization? (2)
22. a) Define Fourier transform. (2)
    b) Write down the mathematical FT representation of an image. (2)
    c) Discuss any two of its properties. (6)
23. a) State the differences between base line and progressive image processing techniques. (2)
    b) Differentiate between lossy and lossless image compression technique. (2)
    c) Briefly discuss about RLE image compression technique. Write down the kernel of Prewitt's operator. (5 +1)
24. a) What is the use of Image Filtering? (3)
    b) Explain the Y C_b C_r Color Model. (3)
    c) Have image averaging is used in image smoothing? (3)
    d) What is Dithering (DITHERING)? (1)

———— × ————