RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. SIXTH SEMESTER EXAMINATION, MAY 2015

THIRD YEAR

Date : 05/05/2015 **COMPUTER SCIENCE (Honours)**

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

[Use a separate Answer book for each group]

Group - A

[*Answer **any four** questions*]

1. a) Describe protocol and standards in computer networking. [4]
   b) Give the difference between ISO – OSI and TCP – IP layer structure. [5]
   c) Define Topology. [1]
2. a) Compare Bandwidth in Hertz with Bandwidth in BpS. [2]
   b) A signal travels from point A to point B. At point A the signal power is 100W. At point B, the power is 90W. What is the attenuation in decibels? [4]
   c) Write a short note on PCM. [4]
3. a) Which of the four digital to analog conversion techniques are the most susceptible to noise? Defend your answer. [3]
   b) Compare TDM and FDM in brief. [4]
   c) Give the difference between Microwave & Infrared Transmission. [3]
4. a) What do you mean by CIDR? [2]
   b) An IP address is given as 192.168.240.16/28. Find out the first address and last address of the block. [3]
   c) Compare TCP and UDP. [2]
   d) What is NAT? [3]
5. a) Differentiate Static and Dynamic web document with example. [4]
   b) Write short note on SMTP. [4]
   c) What is a root server? [2]
6. a) What is FTP? [2]
   b) What is the advantage of hierarchical namespace over a flat namespace. [4]
   c) Explain TELNET. [4]

Group - B

[*Answer **any three** questions*]

7. a) Give an example of a 3×3 kernel for low pass and high pass filters. [1]
   b) What is a linear operator? Taking 2×2 matrices as examples, identify whether the following operations are linear : (a) sum operator (b) max operator. [5]
   c) Consider an image with 8-bit pixel values having minimum and maximum pixel values of 20 and 235, respectively. Give a single intensity transformation function for spreading the intensities, so the lowest intensity is 0 and highest is 255. [4]
8. a) Give the difference between RGB, CMYK and YC_bC_r color with their application. [4]
   b) Define intensity resolution and spatial resolution. How many bits are required to store a 1 megapixel 8-bit RGB color image? [3]
   c) Consider two 8-bit images whose intensity levels span the full range from 0 to 255.
      i) Discuss the limiting effect of repeatedly subtracting image 2 from image 1. Assume that the result is represented also in eight bits.
      ii) Would reversing the order of the images yield a different result? [1·5+1·5]

9. a) Describe the log transformation. What are its applications? [2+1]
   b) Define convolution? What is the 1D convolution of the two signals x[n] = {3,1,2,1} and h[n] = {1,2,1}. [4]
   c) What is image averaging? What are its uses? [2+1]

10. a) Give the expression for histogram equalization for discrete values and explain the notations used in the expression. Obtain the equalization for a 2-bit image of size 8×8 having the intensity distribution as shown below:

r_k		n_k
$r_o = 0$	$\rightarrow$	30
$r_1 = 1$	$\rightarrow$	21
$r_2 = 2$	$\rightarrow$	9
$r_3 = 3$	$\rightarrow$	4

[4]
   b) Explain briefly the Laplacian operator and its use in image sharpening. [2]
   c) What is the Discrete Fourier transform of f(x) = [1,2,3,4] [4]

11. a) If F(u) is the Fourier transform of a continuous function f(t), mathematically show that the Fourier Transform of the sampled function $\bar{f}(t)$ results in an infinite, periodic sequence of copies of F(u), the transform of the original, continuous function f(t). [5]
   b) Give the difference between Lossy & Loss less Image Compression Technique. [3]
   c) What is RLE? [2]

Group - C

[*Answer **any three** questions*]

12. a) "Euler's theorem is a generalization of Fermat's little theorem" —Justify. [4]
   b) Critically comment on the statement : "The security algorithm is known to everybody but the key is unknown". [4]
   c) How modular arithmetic helps to develop security algorithm. [2]

13. a) Develop an entity authentication scheme where the verifier comes to the conclusion that claimant posses or not the secret information without actually knowing the secret information. [7]
   b) Name any three security attacks which can affect the integrity of data. Briefly discuss any one of them. [1·5+1·5]

14. 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) What is Affine Cipher? [2]

15. a) Suppose two parties A and B wish to set up a common secret key (D – H key) between themselves using the Diffle-Hellman key exchange technique. They agree on 7 as modulus and 3 as the primitive root. Party A chooses 2 and Party B chooses 5 as their respective secrets. Find the D – H key.
   Also show how another party C can intercept R_1, sent by A to B, and R_3 sent by B to A. [3+4]
   b) Give the difference between symmetric and asymmetric key cryptography. [3]

16. a) Write a short note on digital envelop. [5]
   b) What do you mean by Salting? Discuss Leslie Lamport one time password scheme. [2+3]

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