

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SIXTH SEMESTER EXAMINATION, MAY 2018

THIRD YEAR [BATCH 2015-18]

COMPUTER SCIENCE (Honours)

Date : 04/05/2018

Time : 11 am – 2 pm

Paper : VII [Gr-A]

Full Marks : 55

[Use a separate Answer Book for each Unit]

UNIT-I

1. Answer **any one** question : [1×5]
- a) Explain whether the following statements are true or false : [2×5×2]
- i) A point determined as inside point using winding number rule can be outside point using odd parity rule.
- ii) A parallel projection gives a realistic representation of an appearance of a 3-D object.
- b) Explain the following terms with example :
- i) Bit Plane [1×5]
- ii) Oblique Cavalier Projection [1×5]
- iii) Homogeneous Co-ordinate System [2]

Answer **any two** questions from **Question Nos. 2 to 5** : [2×10]

2. a) Write the operating characteristics for the following display technologies : [2×5×2]
- i) Thin-film electroluminescent display
- ii) Liquid-crystal display
- b) If a monitor screen has 525 scan lines and an aspect ratio of 3:4 and if each pixel contains 8 bits of intensity information, how many bits per second are required to show 30 frames each second. [3]
- c) How color depth and resolution of an image is related to the video memory requirement? [2]
3. a) Using the midpoint circle algorithm determine the positions along the circle octant in the first quadrant from $x = 0$ to $x = y$, where the circle is of radius $r = 10$ and centre at origin. [4]
- b) For a polygon with vertices A(50,0), B(50,60), C(0,40), D(10,10), E(20,30) prepare an initial sorted edge list and make the active edge list for scan line $y = 15$. [4]
- c) What do you mean by Interpolation and Approximation splines? [2]
4. a) Prove that uniform scaling and rotation form a commutative pair of operations, but in general scaling and rotation are not commutative operator. [4]
- b) Consider a standard ellipse centered at (0,0), where $2a$ is the length of major axis along the X axis and $2b$ is the length of the minor axis along the Y axis. Indicate the necessary transformation that would place the ellipse totally in first quadrant with the major axis passing through (0,0) and (10,10). [6]
5. a) Let, $P(u)$ be the Bezier curve defined over the interval $[0,1]$. Prove the following :
- i) $P(0) = p_0$; $P(1) = p_n$
- ii) $P'(0) = n(p_1 - p_0)$; $P'(1) = n(p_n - p_{n-1})$
- where n is the degree of Bezier curve and $p_0, p_1, \dots, p_n$ are it's control points. [3]

- b) Give the geometrical representation of all blending functions for cubic Bezier curves over the parameter range for 0 to 1. [3]
- c) Show the necessary steps and evaluate the transformation matrix for conversion of object descriptions from world co-ordinate system to viewing co-ordinate system, where the view reference point is specified at world position (x_0, y_0, z_0) . [4]

UNIT-II (CRYPTOGRAPHY)

Answer **any three** questions from **Question Nos. 6 to 10** : [3×10]

6. a) Explain the following terms : [4]
- i) Interception
 - ii) Fabrication
 - iii) Modification
 - iv) Interruption
- b) Given the difference between cryptanalytic and Non-cryptanalytic attack. [2]
- c) Consider a columnar transposition cipher where cipher text is MVCEKSREDEHRTUNTARIHNINRIKNNF and the keyword is TRANSPO. Find the plain text. [4]
7. a) What is Euler's Phi-Function? Find the value of $\phi(10)$ using Euler's Phi-Function. [2+1]
- b) State Fermat's Little Theorem. Find the result of $3^{12} \bmod 11$ using Fermat's Little Theorem. [2+1]
- c) Find the solution to the simultaneous equations :
 $x \equiv 2 \bmod 3$
 $x \equiv 3 \bmod 5$
 $x \equiv 2 \bmod 7$
 using Chinese Remainder Theorem [4]
8. a) In the Diffie-Hellman protocol, what happens if x and y have the same value, that is, Alice and Bob have accidentally chosen the same number? Do, the session keys calculated by Alice and Bob have the same value? Use an example to prove your claims. [4]
- b) Discuss about Electronic Code Book (ECB) and Cipher Feedback (CFB) algorithm mode. [2+2]
- c) What is P-Box? [2]
9. a) What is meet-in-the-middle attack? [2]
- b) Explain the two terms :
 i) Digital Envelop
 ii) Multiplicative Cipher [2·5+2·5]
- c) Alice uses Bob's RSA public Key ($e = 3$, $n = 35$) and sends the cipher text 24 to Bob. Show how Eve can find the plain text. [3]
10. a) Briefly discuss about zero-knowledge authentication mechanism with the help of Fiat-Shamir protocol. [5]
- b) What is digital signature— Explain with example. [3]
- c) What do you mean by one way trapdoor function. [2]

OR
(DATA MINING)

Answer **any three** questions from **Question Nos. 11 to 15** :

[3×10]

11. a) How data are cleaned —Explain with example. [2]
b) Consider the following table and find the similarity between Jack and Mary. [3]

Name	Gender	Fever	Test-1	Test-2	Test-3
Jack	M	Y	P	N	P
Mary	F	Y	P	P	N

- c) Consider the following table and compute the distance between Bimal and Kamal [3]

Name	Performance
Bimal	Excellent
Kamal	Good
Ram	Fair
Shyam	Moderate

- d) What is Data Cube? [2]
12. a) What are the major issues of Data Mining? [2]
b) Discuss any one iceberg computation method. [4]
c) How Data Mining systems are classified? —Explain. [4]
13. a) What do you mean by support and confidence in the context of pattern mining? Explain with examples. [3]
b) How classification by backpropagation are done? [2]
c) Consider the following transaction table.

Tran ID	Item ID
1	I1, I2, I5
2	I2, I4
3	I2, I3
4	I1, I2, I4
5	I1, I3
6	I2, I3
7	I1, I3
8	I1, I2, I3, I5
9	I1, I2, I3

Use Apriory algorithm to find the maximum set of frequent items with a minimum support count 3. [5]

14. a) Consider the following eigen system :

$$\text{eigen value : } \begin{pmatrix} .0490 \\ 1.2840 \end{pmatrix},$$

$$\text{eigen vector : } \begin{pmatrix} -0.7352 & -0.6779 \\ 0.6779 & -0.7352 \end{pmatrix}$$

- Identify the principal component. [2]
- b) If matrix A has an eigen value λ , then what will be the eigen value of A^2 and A^T ? Explain. [4]
- c) If the mean weight of a set of luggages is 29.62 and the standard deviation is 1.52 then identify which of the following individual luggage is outlier with 99.7% confidence?
 (i) 33.89 (ii) 34.88 (iii) 24.81 [3]
- d) What is DMQL? [1]
15. a) What is the difference between classification & prediction? [2]
- b) Discuss C4.5 decision algorithm in brief. [5]
- c) At a certain university, 4% of men are over 6 ft tall and 1% of women are over 6 ft tall. The total student population is in the ratio 3:2 in the favour of women. If a student is selected at random from among all those over 6 ft tall, what is the probability that the student is women. [3]

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