

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SIXTH SEMESTER TAKE-HOME TEST / ASSIGNMENT, JULY 2020

THIRD YEAR [BATCH 2017-20]

Starting Date & Time : 04/07/2020 at 11 a.m. **COMPUTER SCIENCE [Honours]**

Closing Date & Time : 05/07/2020 at 11 a.m.

Paper : VII

Full Marks : 100

(Attempt all the questions from each group)

Group : A

1. Explain all the necessary steps to find the new location of the point P (6, 4, 4) after taking reflection about the line passing through points (5, 4, 3) and (7, 6, 4) . Evaluate new position of the point P after above operation. [8]
2. Establish the midpoint curve drawing algorithm for the curve section in 4th quadrant of a geometrical figure given by the equation $y^2 = 8x$, where $|y| \geq x$ and find the pixel positions to be plotted to draw this curve section. [7]
3. a) Analyze and graphically represent all the blending functions of the Bezier curve for the polynomial of degree four.(graph paper is not necessary)
b) Using suitable clipping algorithm, find the visible part of the polygon with vertices (5, 10) , (10, 25) , (15, 15), (30, 25) and (20, 5) with respect to the clip window having corner points (7, 7) and (25, 20). [5+5]

Group : B

4. a) Explain Quadrature Phase Shift Keying (QPSK) with suitable diagram and its advantage.
b) A nonperiodic composite signal has a bandwidth of 200 kHz, with a middle frequency of 140 kHz and peak amplitude of 20 V. The two extreme frequencies have amplitude of 0. Draw the frequency domain of the signal.
c) What is transponder? [(4+2)+2+1]
5. a) A telephone line has a bandwidth of 3000. The signal-to-noise ratio is 3162. Calculate its channel capacity.
b) Explain the advantages and disadvantages of STP over UTP.
c) What are the differences between synchronous TDM and statistical TDM?
d) Encode 1011001 using Manchester Encoding. [2.5+2+3+1.5]
6. a) Explain the steps to send a message from a mobile device to a computer connected to a same network through a Wi-Fi and wired LAN respectively. Which layer(s) of the TCP/IP protocol suite will have lesser role in for the given scenario?
b) What if circuit switch were used for Internet? State the advantages and disadvantages. [5+4]
7. a) Why did CIDR become necessary? Write the IP address 238.222.222.1 with mask 255.255.240.0 in CIDR notation.
b) What is the importance of dynamic routing protocols?

- c) With absence of an operating system, can two computers connect over network? Justify your answer. [(3+1)+2+3]
8. a) What sequential steps should be followed to host a website over Internet?
- b) What would happen if http protocol service goes missing or gets corrupted in a server computer and in a client computer? Explain your answer for both the cases.
- c) What software tools (APIs) are available to connect to a terminal network. Also write about security measures with them. [3+3+3]

Group : C
(Cryptography)

9. a) Bob sends ciphertext 37 to Alice after using her RSA public key {7,77}. The adversary intercepts the ciphertext and launches attack using the public key of Alice. Write the computation carried out by the adversary to decrypt the ciphertext.
- b) What is the strength of DES algorithm?
- c) In $GF(2^4)$, find the inverse of (x^2+1) modulo (x^4+x+1) [4+3+3]
10. a) Suppose two parties A and B wish to set up a common secret key (D – H key) between themselves using the Diffie-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 the parameter, sent by A to B, and parameter sent by B to A.
- b) “The security algorithm is known to everybody but the key is unknown”-justify.
- c) Discuss different types of attacks in cryptography. [4+3+3]
11. a) Briefly discuss the steps of DES algorithm with the help of Block diagram.
- b) What do you mean by Congruence?
- c) Find the multiplicative inverse of 12 in Z_{26} [5+2+3]

OR
(Artificial Intelligence)

12. a) Suppose you are planning to design a robot which will be cleaning and mopping your room. What are the i) precepts of the agent, ii) operating environment of the agent iii) actions the agent can take iv) architectures that suits the agent?
- b) List two computerized tasks which are related to academics, social or civil society that you think can be improved using AI tools. Justify your answer. [6+4]
13. a) In the travelling salesperson problem (TSP) there is a map involving N cities some of which are connected by roads. The aim is to find the shortest tour that starts from a city, visits all the cities exactly once and comes back to the starting city. Give the initial state, goal test, successor function, and cost function for the problem.
- b) How do you evaluate performance for uninformed search techniques? [7+3]
14. a) Draw a graph representing the buildings inside Vidyamandira campus and paths between them. Buildings should be represented using vertices. If there is a path between building A to B, draw an edge between them. Provide weights to the edges according to your judgement. Perform A* search from college main gate and Vivek Bhawan. Show intermediate steps.
- b) State how alpha-beta pruning improves performance of a game tree. [7+3]

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