NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI
END SEMESTER EXAMINATION - July. 2021 SESSION

DEPARTMENT : Computer Science and Engineering

DATE & TIME OF EXAM : 04-12-2021 & 12PM

SUB CODE : CSPC53 DURATION:120mins

Note to Student:

1. **Make sure the 'Declaration and statement of authorship' is uploaded along with the answer sheet as cover sheet (First Sheet)**
2. **TIME MANAGEMENT IS YOUR RESPONSIBILITY**

Instructions:

1. Answer ALL Questions.
2. Write your Name, Roll No. and Page No. in all the sheets.
3. Maximum duration is 120 Min. Extra 30 Min is **ONLY** for uploading your answer sheets (as a PDF file) in the portal.
4. Answer sheets should be sent through portal and **NOT** in any other way.
5. While answering, clearly give your assumptions (if any) and examples.
6. **While converting your name to the required bit sequence, consider the following:**

(i) Vowels in your name are replaced by binary 1 and the rest by binary 0.

(ii) Don't consider space or Dot.

(iii) No case Sensitive.

(iv) If your name has lesser number of characters than the requirement, repeat your name to match the required length.

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1. (a) With S-DES, decrypt the string **01110101** with a key which is obtained as per the Instruction 6. (3)

(b) Differentiate the following in tabular format (give atleast the most valid two differences)

(i) Network layer in OSI and in TCP/IP (7 x1= 7)

(ii) Error control in Data link layer and in Transport layer

(iii) Congestion control in Network Layer and in Transport layer
(iv) Sequence number in Data link layer and in Transport layer
(v) Data link layer delivery and Transport layer delivery
(vi) Checksum with all 0's and all 1's in UDP
(vii) Substitution and Transposition cryptography

2. (a) Construct a data word of length 7 as per the Instruction 6. Assume that it is encoded with the necessary number of redundant bits for single bit error correction, use the method of Hamming code with odd parity to determine the values of the redundant bits. Demonstrate the single bit error correcting power of Hamming code by deliberately inserting a single bit error in the sixth position of the code word and perform a complete check. (3)

(b) Construct a message of length 10 bits as per the Instruction 6. Assume that the message is protected from errors using the polynomial $X^5 + X^4 + X^2 + 1$. Using polynomial division, determine the message that should be transmitted. Also, check for the burst error detection capability of the divisor. (3)

3. (a) Illustrate the issues encountered in random access methods? How can they be minimized/avoided? (2)

(b) Broadcast and unicast communication are the same on the network with linearly connected stations. Agree or disagree? Justify your answer. (2)

4. (a) Assume that a Client process opens a connection with an Initial Sequence Number (ISN) 12345 and the server process opens the connections with an ISN of 54321. Show the following (4)

(i) TCP segments (with sufficient information) during the connection establishment.

(ii) TCP segments during the data transmission if a client sends a segment containing the message "Hello Dear customer" and the server answers with a segment containing "Hi there seller." (Assume the reasonable values for the required parameters)

(iii) After transmitting the data successfully, both the parties want to terminate the connection. Show the required TCP segments (with sufficient information) during the connection termination. Assume that the final ACK from the client is lost. Discuss the subsequent events triggered by this loss.

(b) Draw a proper state transition diagram (not a time line diagram) with sufficient information to illustrate the various possibilities of ACK generation. (3)

5. An organization has totally 16,384 addresses starting from 120.14.64.0. It decides to distribute these addresses to four of its headquarters A, B, C and D, each with 4096 addresses. The headquarters A and D have the following address allocations.

(i) The headquarters A distributes the addresses to eight of its branch offices, each with 512 addresses. Further, each of these branch offices allocates addresses to 128 customers, each with 4 addresses.

(ii) The headquarters D assigns the addresses to its sixteen branches, each with 256 addresses.

Give the starting and ending address allocation for all the hierarchical levels (Organization, Head Quarters, Branch and customer), along with subnet mask. (3)