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(U/S 3 of the UGC Act 1956)

THINK MERIT | THINK TRANSPARENCY | THINK SASTRA

School of Computing
First CIA Examination – Feb 2025
Course Code: CSE322
Course Name: Computer Networking
Principles & Components
Duration: 90 minutes   Max Marks: 50

Answer all the questions   **5*10 = 50 Marks**

1. Explain the core functionalities of each layer in ISO-OSI reference model with a neat diagram.

2. a) Discuss the essential features and real-world applications of different types of transmission modes. [8M]

   b) A full mesh network has 10 devices. How many links are required? [2M]

3. a) Assume we need to transmit the following 4-bit words: 1010 1101 0110 1001. Calculate checksum [4M]

   b) Four channels are multiplexed using TDM. If each channel sends 100 bytes/s and we multiplex 1 byte per channel. Show the frame traveling on the link, the size of the frame, the duration of a frame, the frame rate, and the bit rate for the link. [6M]

4. a) We have four sources, each creating 250 characters per second. If the interleaved unit is a character and 1 synchronizing bit is added to each frame, find
   - i. data rate of each source,
   - ii. duration of each character in each source,
   - iii. frame rate,
   - iv. duration of each frame,
   - v. number of bits in each frame, and
   - vi. data rate of the link. [6M]

b) List out the advantages and disadvantages of DSSS. [4M]

5. a) A bit stream 1101011011 is transmitted using the standard CRC method. The generator polynomial is x^4+x+1. What is the actual bit string transmitted? [5M]

b) Given 4-bit Data: D1=1, D2=0, D3=1, D4=1

Determine the parity bits (P1, P2, P3) and then construct the transmitted code. Suppose a bit error occurs, changing the code to: 1110110[D4->P1]. Detect and correct the error using Hamming Code. [5M]

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School of Computing
Second CIA Examination – Mar 2025
Course Code: CSE322
Course Name: Computer Networking Principles & Components
Duration: 90 minutes   Max Marks: 50

PART-A

Answer any 4 questions   **5*10 = 50 Marks**

1. a) If transmission delay and propagation delay in a sliding window protocol are 1 msec and 49.5 msec respectively, then: [6M]
   i.   What should be the sender window size to get the maximum efficiency?
   ii. What is the minimum number of bits required in the sequence number field?
   iii. If only 6 bits are reserved for sequence numbers, then what will be the efficiency?

   b) List out the advantages and disadvantages of Piggybacking.   [4M]

2. a) There are 5 stations in slotted LAN. Each station attempts to transmit with a probability P=0.2 in each time slot. What is the probability that ONLY one station transmits in a given time slot? [2M]

   b) Write short notes on Binary (Exponential) Backoff algorithm. [4M]

   c) In a CSMA/CD network running at 1 Gbps over 2 km cable with no repeaters, the signal speed in the cable is 400000 km/sec. What is minimum frame size? [4M]

3. a) Compute the CSMA/CD efficiency for the given parameters: Propagation delay (tp) = 5 µs, Frame size = 1500 bytes, Data rate = 10 Mbps. [4M]

   b) In Go back 4, if every 6th packet that is being transmitted is lost and if total number of packets to be sent is 10, then how many transmissions will be required? Show with a timeline diagram. [6M]

4.a) A 10 MB (Megabyte) file needs to be sent over a packet-switched network. The network link has a transmission rate of 10 Mbps (Megabits per second), and the packet size is 1 KB (Kilobyte). The propagation delay is 10 ms (milliseconds), and each packet has a processing delay of 2 ms at the router. Assume no queuing delay. [6M]

Find:

i.   Number of packets required to transmit the file
ii.   Time taken to transmit one packet
iii.   Total transmission time for the entire file

b) Under what conditions would circuit switching be a better network design than packet switching? [4M]

5.a) Suppose you have a packet of 1700 bytes to be transmitted over an MTU of 1500 bytes. Show how IP fragmentation is done highlighting all the fields in Fragmentation. [4M]
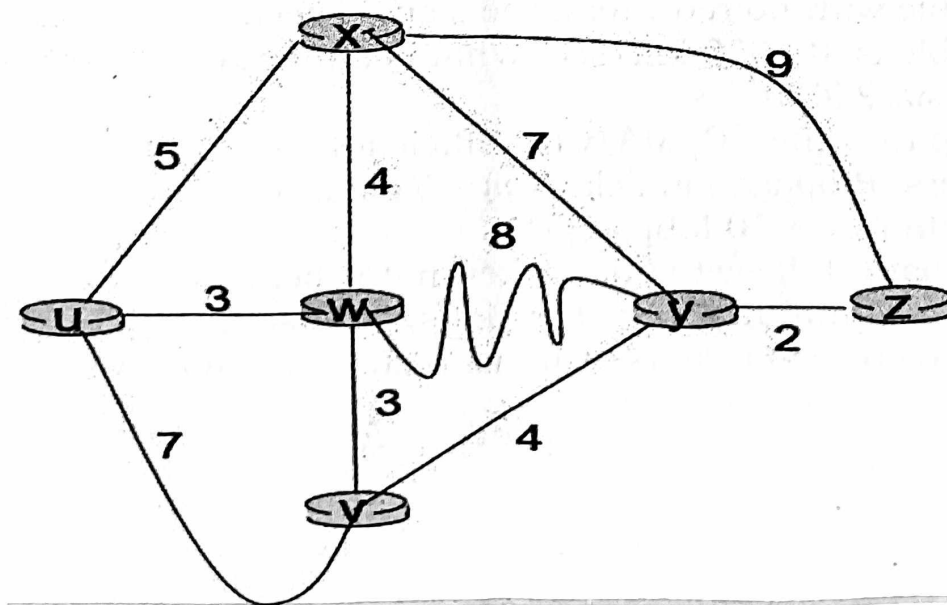
b) Write the range of Private IP addresses. [2M]

c) Illustrate DORA Process in DHCP with a neat example. [4M]

PART-B

6.a) How many subnets can be created and how many hosts can be connected to each subnet for the IP Address 172.16.0.0/20. Identify the class and Specify the Customized subnet mask. [3M]

b) Apply Djikstra's algorithm to find the shortest path from U to all other nodes in the following network diagram. Show the MST diagram. [7M]

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THINK MERIT I THINK TRANSPARENCY I THINK SASTRA

School of Computing
Third CIA Examination – Apr 2025
Course Code: CSE322
Course Name: Computer Networking
Principles & Components
Duration: 90 minutes   Max Marks: 50

PART-A

Answer any 4 questions   **4*10 = 40 Marks**

1. a) Suppose a TCP connection is transferring a file of 5000 bytes. The first byte is numbered 10001. What are the sequence numbers for each segment if data are sent in five segments, each carrying 1000 bytes? [2M]

    b) Consider an instance of TCP's AIMD algorithm where the window size at the start of the slow start phase is 4 MSS and the threshold at the start of first transmission is 32 MSS. Assume that time out occurs during the 6th transmission and starts with 1 MSS. Find the congestion window size at the end of 9th transmission[8M]

2. a) Subnet the IP address 180.20.0.0 into 380 hosts in each subnet. Identify Class, Default Subnet Mask, Customized Subnet Mask. Also Find out the No. of possible subnets, Usable IP Range, Network Address and Broadcast Address only for first 4 subnets. [7M]

    b) Write short notes on Count-to-infinity problem. [3M]

3. a) Apply Dijkstra's Routing Algorithm to find the shortest path. Assume node "A" as Root Node. Show the minimum spanning tree. [8M]
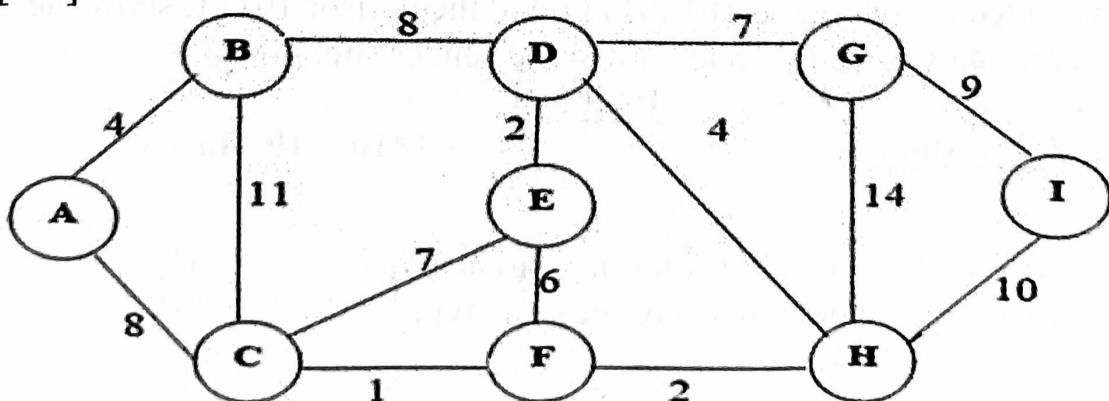
b) A packet has arrived in which the offset value is 100, the value of HLEN is 5, and the value of the total length field is 100. What are the numbers of the first byte and the last byte?   [2M]

4.a) A path in a digital circuit-switched network has a data rate of 1 Mbps. The exchange of 1000 bits is required for the setup and teardown phases. The distance between two parties is 5000 km. Answer the following questions if the propagation speed is 2×10^8 m:

    i.   What is the total delay if 1000 bits of data are exchanged during the data-transfer phase?

    ii.   What is the total delay if 100,000 bits of data are exchanged during the data-transfer phase?

    iii. What is the total delay if 1,000,000 bits of data are exchanged during the data-transfer phase?   [6M]

b) What are the propagation time and the transmission time for a 2.5KB (kilobyte) message (an email) if the bandwidth of the network is 1 Gbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 m/s. [4M]

5.a) There are only three active stations in a slotted Aloha network: A, B, and C. Each station generates a frame in a time slot with the corresponding probabilities $pA = 0.2$, $pB = 0.3$, and $pC = 0.4$ respectively.

  i. What is the probability that any station can send a frame in the first slot?

  ii. What is the probability that station A can successfully send a frame for the first time in the second slot?

  iii. What is the probability that station C can successfully send a frame for the first time in the third slot?   [6M]

b) Given the dataword 101001111 and the divisor 10111, show the generation of the CRC codeword at the sender site. [4M]

PART-B

6.a) Discuss DNS name resolution with neat diagrams. [6M]
  b) List out the components & message types of SNMP. [4M]