iv) State the subnet IP, range of usable host IPs and broadcast IP of the first subnet. 1+1+1+3

8 (a) Draw the Header format for IPv4 citing field names and their lengths. Distinguish between IPv4 and IPv6. 2+3

(b) Discuss the Link state routing algorithm with suitable example. 5

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B.Tech Even Semester Examination, May, 2025

Computer Science & Engineering

(6th Semester)

Course No: CSE-602

(Computer Networks)

Full Marks: 50

Pass Marks: 25

Time: 2 hours

Note:

1. Attempt any five questions
2. Begin each answer in a new page
3. Answer parts of a question at a place
4. Assume reasonable data wherever required
5. The figure in the right margin indicates full marks for the question
6. All the mathematical symbols and abbreviations have their usual meanings.

1. (a) A sender needs to send the four data items 3456, ABCC, 02BC, and EEEE.Answer the following:

i. Find the checksum at the sender site.

ii. Find the checksum at the receiver site if there is no error

iii. Find the checksum at the receiver site if the second data item is changed to ABCE. (6)

(b) What is the total delay(latency) for a frame of size 5 million bits that is being sent on a link with 10 routers each having a queuing time of 2ìs and a processing time of 1ìs.The length of the link is 2000 km. The speed of light inside the link is 2 x 10^8 m/s. The link has a bandwidth of 5 Mbps. Which component of the total delay is dominant? Which one is negligible? (3)

(c) Draw a hybrid topology with a ring backbone and two bus networks. (1)

2. (a) Why there is a need for layered architecture?Write down the similarities and differences between OSI/ISO Reference Model and TCP/IP Reference Model. (1+4)

(b) How does a single-bit error differ from a burst error? Discuss the concept of redundancy in error detection and correction. Distinguish between forward error correction versus error correction by retransmission (5)

3. (a) Transmitter want to transmit the message 1011 0010 0100 1011 and protect it from errors using the CRC-8 polynomial x8+ x2+ x+1.

(i) Use polynomial long division to determine the message that should be transmitted.

(ii) Suppose the leftmost bit of the message is inverted due to noise on the transmission link. What is the result of the receiver's CRC calculation? How does the receiver know that an error has occurred? (5)

(b) Mention various taxonomies of multiple-access protocols. Compare random access protocols vscontrolled access protocols vs channelization protocols. (5)

4. (a) What is the need of Flow control? Explain the common approaches for flow control in data link layer. (5)

(b) Explain Hamming Codes with an example. (3)

(c) What is the definition of a linear block code? What is the definition of a cyclic code?(2)

5. (a) Why are transport layer protocols like TCP and UDP called end-to-end protocols? Distinguish between TCP & UDP 1+2

(b) Explain the TCP connection establishment and connection release procedure 2+2

(c) What is a port number, and how is it different from a socket address? Give the port number ranges falling in different categories 2+1

6. (a) What is meant by saying that HTTP is a stateless protocol? What is the role of cache in HTTP? Compare HTTP and HTTPS. 4

(b) Mention the advantages of a hierarchical name space over a flat namespace. 2

(c) Describe the working of DNS resolution (recursive vs iterative) 4

7. (a) Explain the working of Network Address Translation(NAT) with neat diagram. 4

(b) Given a network address 190.22.0.0, answer the following :

i) Which class does it belong to? What is the natural netmask of this class?

ii) How many subnets may be created in this network with subnet mask/19?

iii) What is the block size for each of those subnets?