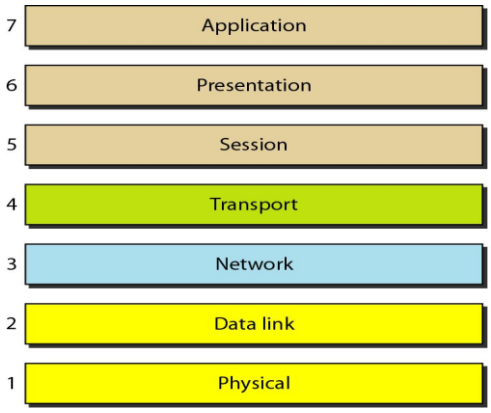
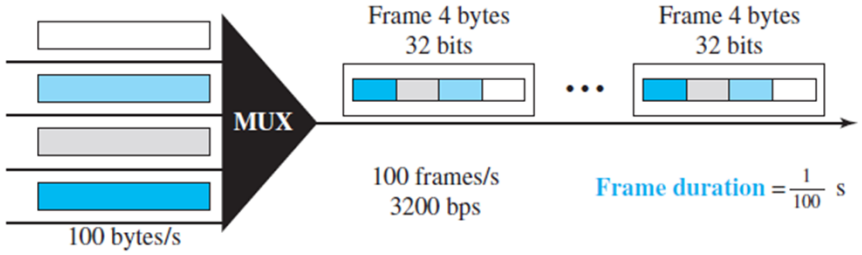
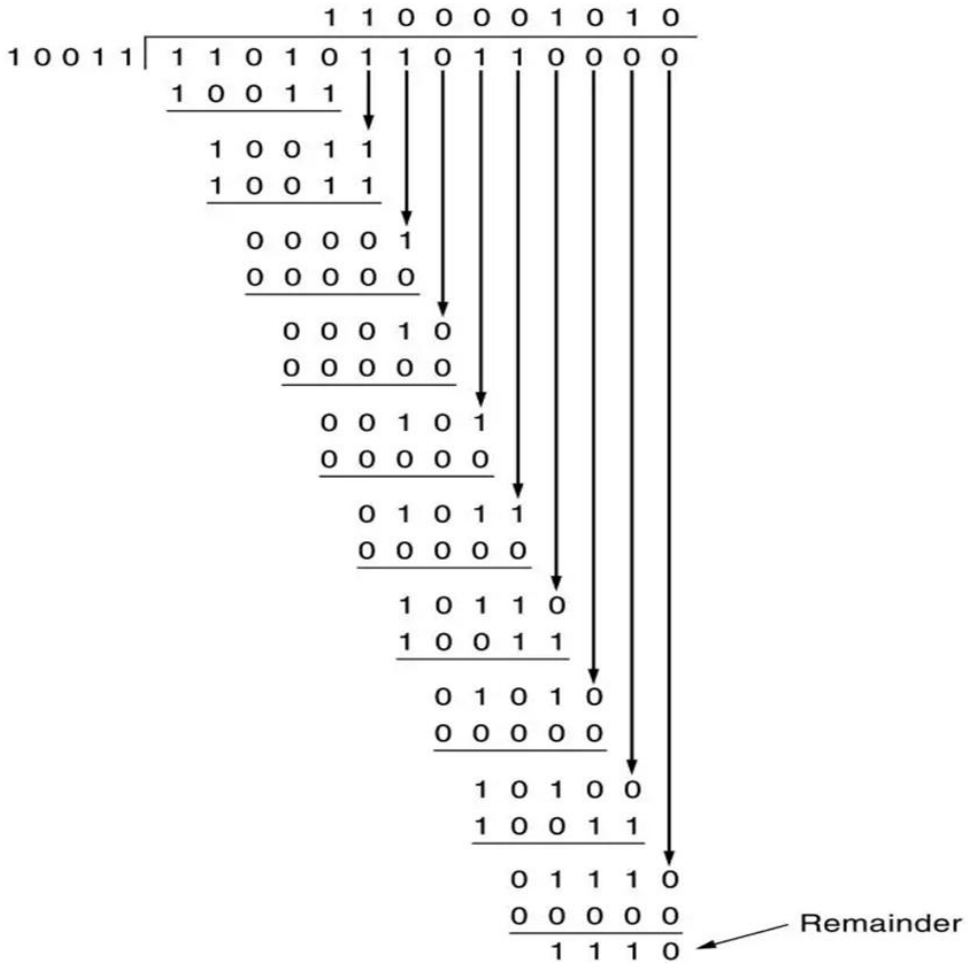
SASTRA ENGINEERING · MANAGEMENT · LAW · SCIENCES · HUMANITIES · EDUCATION DEEMED TO BE UNIVERSITY (U/S 3 of the UGC Act, 1956) THINK MERIT | THINK TRANSPARENCY | THINK SASTRA	**School of Computing** **First CIA Examination – Feb 2025** Course Code: CSE322 Course Name: Computer Networking Principles & Components Duration: 90 minutes Max Marks: 50

Answer Key

Q.No	Questions	Marks
1	Explain the core functionalities of each layer in ISO-OSI reference model with a neat diagram.  **Diagram** **Explanation**	2M 8M
2	Discuss the essential features and real-world applications of different types of transmission modes. **1. Simplex mode:** Data flows in **only one direction**. There is no provision for the receiver to send data back to the sender. **Key Characteristics:** • Unidirectional communication. • No feedback or acknowledgment from the receiver. • Simple and cost-effective. **Applications:** • Television broadcasting. • Radio broadcasting. • Keyboard-to-monitor data transmission. **2. Half-Duplex Mode** Data flows in **both directions**, but only **one direction at a time**. The sender and receiver take turns transmitting data. **Key Characteristics:** • Bi-directional communication, but not simultaneous. • Efficient use of the communication channel. • Requires coordination to avoid collisions.	8M

	Applications: • Walkie-talkies. • Two-way radio communication. • CSMA/CD in Ethernet. **3. Full-Duplex Mode** Data flows in **both directions simultaneously**. Both sender and receiver can transmit and receive data at the same time. **Key Characteristics:** • Bi-directional and simultaneous communication. • Higher efficiency and faster communication. • Requires separate channels or advanced protocols to avoid interference. **Applications:** • Telephone networks. • Video conferencing. • High-speed internet connections (e.g., fiber-optic communication). b) **n*(n-1)/2 = 45 links**	2M
3	a) Assume we need to transmit the following 4-bit words: 1010 1101 0110 1001. Calculate checksum **Checksum = 0111** 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. • Size of each frame is **4 bytes, or 32 bits.** • The duration of a frame is **1/100 s.** • Bit rate is 100 × 32, or **3200 bps.** Figure 6.16 *Example 6.8*  	4M 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. i) The data rate of each source is 250 × 8 = 2000 bps = 2 kbps.	6M

	ii) The duration of a character is 1/250 s, or 4 ms. iii) 250 frames per second. iv) The duration of each frame is 1/250 s, or 4 ms. v) Each frame is 4 × 8 + 1 = 33 bits. vi) Data rate of the link is 250 × 33, or 8250 bps. b) List out the advantages and disadvantages of DSSS. Advantages of DSSS: Resistance to Interference,Security,Multipath Fading Resistance,Lower Probability of Interception Disadvantages of DSSS: Bandwidth Consumption, Complexity,Power Consumption	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?  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. Detect and correct the error using Hamming Code. **P1=0, P2=1, P3=0** **C3,C2,C1 = [1 0 1]** **Error at bit position 5**	5M 5M