

## SEMESTER END EXAMINATIONS – AUGUST / SEPTEMBER 2023

<b>B.E. – CSE (Cyber Security) /</b>			
<b>Program</b>	<b>: CSE (Artificial Intelligence and Machine Learning)</b>	<b>Semester</b>	<b>: IV</b>
<b>Course Name</b>	<b>: Data Communication and Networking</b>	<b>Max. Marks</b>	<b>: 100</b>
<b>Course Code</b>	<b>: CY42 / CI42</b>	<b>Duration</b>	<b>: 3 Hrs</b>

### Instructions to the Candidates:

- Answer one full question from each unit.

### UNIT - I

- What is data communication? What are the four important fundamental characteristics of Data Communication? CO1 (06)
  - What is a protocol? Briefly explain its key elements. CO1 (05)
  - Explain the responsibilities of Physical, Data link, Network and Transport layer in OSI reference model. CO1 (09)
- Briefly discuss pros & cons of Mesh and Star topologies. CO1 (06)
  - With a neat diagram, explain TCP/IP reference model. CO1 (10)
  - What are the differences between Physical address, Logical address and Domain name? CO1 (04)

### UNIT - II

- Illustrate the process of Quantization in Pulse Code Modulation by considering eight quantization levels, sample normalized amplitude values: 7.5, 19.7, 11.0, -5.5, -11.3, -6.0 and sample amplitudes between -20V and +20 V. CO2 (08)
  - Illustrate the concept Bandwidth and delay product by CO2 (08)
    - assuming that we have a link with a bandwidth of 1 bps further assume that the delay of the link is 5 secs.
    - assuming that we have a link with a bandwidth of 4 bps further assume that the delay of the link is 5 secs.
  - Assume that  $SN \sim B = 36$  and the channel bandwidth is 2 MHz. Calculate the theoretical channel capacity. CO2 (04)
- Draw the graph of Manchester, Differential Manchester, NRZ-I, polar RZ, scheme for the 010011 data stream, assuming last signal level has been positive with bit 1. CO2 (08)
  - Discuss different causes for transmission impairments. CO2 (08)
  - What are the propagation time and the transmission time for a 2.5-kbyte message (an e-mail) 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  $2.4 \times 10^8$  meters per sec. CO2 (04)

## UNIT - III

5. a) A bit stream 10011101 is transmitted using the standard CRC method. CO3 (10)  
The generator polynomial is  $x^3+1$ .  
i. What is the actual bit string transmitted?  
ii. Suppose the third bit from the left is inverted during transmission.  
How will receiver detect this error?
- b) With the help of flow diagram explain how frame loss and CO3 (10)  
acknowledgement loss is handled in Stop and Wait ARQ protocol.
6. a) Illustrate the process of bit stuffing and byte stuffing in bit oriented and CO3 (10)  
character-oriented protocols by taking an example for each.
- b) Write the sender side and receiver side algorithm of Go-Back-N ARQ CO3 (10)  
protocol.

## UNIT- IV

7. a) Discuss different controlled access protocols. CO4 (06)  
b) Enumerate the working of CSMA/CA with the help of flow diagram. CO4 (10)  
c) Discuss the vulnerable time of pure and slotted ALOHA. CO4 (04)
8. a) Enumerate the working principle of Code-Division Multiple Access CO4 (08)  
(CDMA) by assuming four stations (1, 2, 3, 4) connected to the same channel.
- b) Explain behavior of different persistence methods followed when a CO4 (04)  
station finds a channel busy in CSMA.
- c) A pure ALOHA network transmits 200-bit frames on a shared channel of CO4 (08)  
200 kbps. What is the throughput if the system produces:  
i) 1000 frames per second  
ii) 500 frames per second.

## UNIT - V

9. a) Illustrate different cases of IEEE 802.11 addressing mechanism. CO5 (10)  
b) Discuss different types of network architecture supported in Bluetooth. CO5 (10)
10. a) Illustrate the process of learning in bridges. CO5 (10)  
b) Discuss hidden and exposed station problem in IEEE 802.11 and discuss CO5 (10)  
the solutions for the same.

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