



**Mahindra University ,Hyderabad**  
**Ecole Centrale School of Engineering**  
**Minor-I**

**Program: B. Tech/M.Tech(Int)**      **Branch: CSE/ECM/CM**  
**Subject: Computer Networks (2202)**

**Semester: VI**

**Date: 25.02.2025**

**Time: 10.00 AM - 11.30 AM**  
**Max. Marks: 40**

**Time Duration: 1.5 Hours**

**Instructions:**

- 1) Ensure your answers are well-structured by labeling each question and sub-question and following the sequence in which they appear in the question paper.
- 2) If a question appears ambiguous, clearly state your assumption(s) and then proceed to answer or solve it accordingly.
- 3) If a question involves calculations, show all steps and workings clearly.

<b>Q.No</b>	<b>Questions</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>	<b>PO</b>	<b>PI</b>
1(a)	Describe various transmission modes with examples.	4	2	L2	1,2,3,4 ,10,12	
1(b)	Assume that the source S and destination D are connected through three intermediate routers, labeled R1, R2, and R3. Determine how many times a packet must visit the Network Layer and the Data Link Layer during transmission from S to D.	3	1	L5	1,2,10, 12	
1(c)	List the protocols used in each layer of TCP/IP protocol stack.	4	1	L1	1,2,10, 12	
2(a)	Neatly draw the waveforms resulting from NRZ-L, Manchester, Differential Manchester, and AMI signaling for transmitting the bit stream "01001110".	5	2	L6	1,2,3,4 ,10,12	
2(b)	A traditional telephone line has a bandwidth of 4 kHz and uses 8-level signaling. What is the theoretical maximum bit rate on a noiseless channel?	3	2	L1	1,2,3,4 ,10,12	
3(a)	For a 2-Gbps Ethernet network, find the total end-to-end delay for transmitting a 10,000-bit packet from source to destination through three store-and-forward switches. The packet travels from the source through three switches to the destination, with each link having a propagation delay of 15 $\mu$ s. Assume that each switch begins retransmission immediately after receiving the complete packet.	4	2	L1	1,2,3,4 ,10,12	
3(b)	What is network switching? Explain the difference between circuit switching and packet switching.	5	2	L2	1,2,3,4 ,10,12	

4	<p>A bit stream 10011101 is transmitted using the standard Cyclic Redundancy Check (CRC) method. The generator polynomial used is <math>x^3+1</math>.</p> <p>(a) Calculate the transmitted bit string after appending the CRC code to the original bit stream.</p> <p>(b) Suppose the third bit from the left in the transmitted bit string is inverted during transmission. Explain how the receiver will detect this error using the CRC method.</p>	(3+2)	3	L2	1,2,3,4 ,10,12
5(a)	<p>The values of parameters for the Stop-and-Wait ARQ protocol are as given below:</p> <p>Bit rate of the transmission channel = 1 Mbps      Propagation delay from sender to receiver = 0.75 ms      Time to process a frame = 0.25 ms      Number of bytes in the information frame = 1980      Number of bytes in the acknowledge frame = 20      Number of overhead bytes in the information frame = 20</p> <p>Assume that there are no transmission errors. Determine the transmission efficiency (in %) of the Stop-and-Wait ARQ protocol for the above parameters.</p>	5	3	L5	1,2,3,4 ,10,12
5(b)	How can you determine if poor call quality during video conferences is caused by insufficient bandwidth?	2	2	L1	1,2,3,4 ,10,12