Programme: B E – Computer Science and Engineering (AI&ML) and CSE (Cyber Security)
Internal Assessment – I

TERM: 15th April 2024 – 27th July 2024	COURSE NAME: Data Communication and Networking
DATE: 30-05-2024 TIME: 9.30-10.30	COURSE CODE: CY42/CI42
MAX MARKS: 30	PORTIONS: L1 to L19

Mobile Phones are banned

Instructions to Candidates: **Answer any two full questions. Marks: 15x2=30**

Q. NO	Questions	Blooms Levels (L1 to L6)*	CO	Marks
1.a	Consider a multinational corporation with offices in five different countries. Each office needs to be interconnected for seamless communication, file sharing, and collaborative work in a mesh topology. How many connections are needed for mesh network? Compare it with a star topology, where all offices are connected to a central headquarters or data centre.	L3	CO1	5
1.b	Explain architecture and functionality associated with each layer of OSI model and compare it with TCP/IP protocol suite.	L4	CO1	10
2.a	Draw the line coding graph for Unipolar, RZ, NRZ-L, NRZ-I, Manchester, Differential Manchester, AMI and Pseudo ternary schemes for the following data stream: 10011010.	L2	CO2	8
2.b	Consider a network engineer responsible for managing data transmission between two offices of a multinational corporation located in different cities. Node A has a data word "101001111" representing a segment of the financial report. Before transmitting this data to Node B, it needs to be encoded with CRC using the divisor "10111". Calculate CRC.	L3	CO3	4
2.c	Consider a noisy channel with $SNR_{dB} = 36$ and the channel bandwidth is 2 MHz. Calculate the capacity of the channel.	L3	CO2	3
3.a	Consider Alice wants to securely transmit a 4-bit message 1101 to Bob over an unreliable communication channel. She wants to ensure that the message reaches Bob without any errors. To achieve this, she decides to encode the message using Hamming code before transmission. Calculate the hamming code to ensure error detection during transmission.	L3	CO3	6
3.b	Describe transmission impairment and explain the causes for it.	L2	CO2	6
3.c	Consider a binary code that contains 4 valid codewords as follows: 00000,01011,10101, 11110.Calculate d_{min} and calculate the maximum number of erroneous bits that can be corrected by the d_{min}.	L3	CO3	3