



Indian Institute of Information Technology, Lucknow

Mid Semester Examination 2024

B.Tech 3rd Semester CS/IT/CSAI/CSB

Subject: Data Communication (DCO3300C)

Duration: 2Hrs

Instruction: The paper contains two sections.

Date: 23/09/2024

Total Marks: 40 (10 MCQ+30 Subjective Ques)

Section I – Multiple Choice Questions (MCQs)

(10 Questions, 1 Marks Each, All Questions are Compulsory)

- 1) Which topology has a single central node to which all other nodes are connected?
 - A. Ring topology
 - B. Mesh topology
 - C. Star topology
 - D. Bus topology
- 2) In a network, what is the purpose of a repeater?
 - A. To amplify the signal
 - B. To transmit data
 - C. To reduce noise
 - D. To increase bandwidth
- 3) Which of the following protocols provides connection-oriented communication over the Internet?
 - A. UDP (User Datagram Protocol)
 - B. FTP (File Transfer Protocol)
 - C. TCP (Transmission Control Protocol)
 - D. ICMP (Internet Control Message Protocol)
- 4) Which of the following techniques is NOT used for digital-to-analog conversion?
 - A. Amplitude Shift Keying (ASK)
 - B. Frequency Shift Keying (FSK)
 - C. Pulse Code Modulation (PCM)
 - D. Phase Shift Keying (PSK)
- 5) In a DAC system, quantization error is directly related to:
 - A. The number of bits used for encoding
 - B. The sampling frequency
 - C. The transmission medium
 - D. The modulation scheme
- 6) In digital communication, what is the term used for the number of signal elements transmitted per second?
 - A. Bandwidth
 - B. Baud rate
 - C. Bit rate
 - D. Frequency
- 7) In Frequency Modulation (FM), what characteristic of the analog carrier signal is varied according to the input signal?
 - A. Amplitude
 - B. Frequency

P.T.O

- C. Phase
D. Bit rate
- 8) Which analog modulation technique is least affected by noise and interference?
A. Amplitude Modulation (AM)
B. Frequency Modulation (FM)
C. Phase Modulation (PM)
D. Pulse Amplitude Modulation (PAM)
- 9) What is the bandwidth required for an AM signal, given that the modulating signal has a maximum frequency of 5 kHz?
A. 5 kHz
B. 10 kHz
C. 15 kHz
D. 20 kHz
- 10) Which of the following represents the total power in an AM signal?
A. Carrier power
B. Power in the sidebands
C. The difference between carrier power and sideband power
D. The sum of carrier power and sideband power

Section II – Subjective Questions

(There are 5 questions in total. Marks are indicated against each question.
Questions 1 to 4 are compulsory. Attempt any one question from Question 5.)

- ① Explain TCP/IP protocol suite with neat diagram? What are the services provided by Physical layer in an OSI model? (5)
- 2) What is Sampling theorem? The channel has bandwidth B = 4KHz. Determine the channel capacity for signal-to-noise ratio of 30dB. (5)
- 3) What is the difference between Port Addressing, Logical addressing and Physical addressing? What is the significance of using Logical addressing? (5)
- ④ Explain any three techniques for Digital-to-Digital Conversion. What is the various digital representation possible for the input data 10110. (5)
- 5) An unmodulated AM power is given by 10KW. When the carrier is modulated by 1st message signal, AM power is increased to 13.5KW. Find AM power if the carrier is simultaneously modulated with 2nd message signal with 60% of modulation. (10)

OR

A carrier signal of $c(t)=10\cos(2\pi \cdot 10^5 t)$ is amplitude modulated by a message signal of $m(t)=4\cos(\pi \cdot 10^4 t)$ with $\mu=0.5$. Load resistance is given by 5Ω . Find bandwidth, total power and power efficiency. (10)