Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree (S,FE) Examination January 2023 (2015 scheme)

Course Code: CS307

Course Name: DATA COMMUNICATION

Max. Marks: 100   Duration: 3 Hours

PART A

Answer all questions, each carries3 marks.   Marks

1	How does the spectrum of periodic and aperiodic signals vary?	(3)
2	Comment and compare attenuation and distortion with diagrams.	(3)
3	Discuss any three differences between terrestrial microwave transmission and satellite microwave transmission.	(3)
4	List any three disadvantages of optical fiber cable.	(3)

PART B

Answer any two full questions, each carries9 marks.

5	a)	Memorize and report the time domain and frequency domain characteristics of a signal.	(6)
	b)	What is the length of a bit in a channel if the propagation speed in the medium is 2×10^8 m/s and the channel bandwidth is 2 Mbps?	(3)
6	a)	Differentiate data rate and bandwidth. How is the channel capacity related to these parameters?	(4)
	b)	A telephone line normally has a bandwidth of 3000 Hz (300 to 3300 Hz) assigned for data communication. The SNR is usually 3162. What will be the capacity for this channel? Assume that SNR (dB) is 36 and the channel bandwidth is 2 MHz. Calculate the theoretical channel capacity.	(5)
7	a)	List out the design parameters for selecting the transmission media. Discuss the transmission characteristics of twisted pair cables.	(5)
	b)	Brief about different transmission modes.	(4)

PART C

Answer all questions, each carries3 marks.

8	Sketch the data pattern 101011001 using RZ, NRZ-I, and NRZ-L coding techniques.	(3)

9   Represent the pulse code modulation technique with a diagram.   (3)

10   Describe ADSL configuration.   (3)

11   List any three advantages and disadvantages of wavelength division multiplexing.   (3)

PART D
Answer any two full questions, each carries 9 marks.

12 a) Encode the data pattern 01001100011 with (a) Manchester coding (b) Differential Manchester coding (c) Bipolar- AMI techniques.   (6)

    b) Explain the unipolar encoding technique.   (3)

13 a) Assume that a service provider is having an available bandwidth from 200 to 300kHz for digital transmission. Calculate the carrier frequency and bit rate if they modulate the signal by using (a) ASK (b) FSK. Assume the factor d=1, and maximum frequency deviation Δf=25kHz.   (6)

    b) Demonstrate the CDMA technique with a sample code.   (3)

14 a) State any multiplexing technique used with multi-core fibers to meet increasing data traffic and explain it.   (5)

    b) Describe how data rate is managed in synchronous TDM.   (4)

PART E
Answer any four full questions, each carries 10 marks.

15 a) Classify synchronous and asynchronous data transmission systems with neat sketches   (3)

    b) Discuss major types of errors in data communication.   (3)

    c) Assuming odd parity, find the parity bit for each of the following data: (4)
        i) 1010101 ii) 0000001 iii) 1000010 iv) 1101101

16 a) Assume that data is 10110 and code generator is 1101. Calculate the CRC bits and transmission word. If the received message is 10110110, check whether the error is detected by CRC or not.   (6)

    b) List the advantages and disadvantages of the Cyclic Redundancy Check method.   (4)

17 a) Define minimum Hamming distance and its significance. Also, mention the minimum hamming distance for error detection and error correction.   (4)

    b) Find the d_{min} of the coding scheme for code-words: (6)
        i. (00000, 01011)   ii. (00000, 10101)
        iii. (00000, 11110)   iv. (01011, 10101)

v. (01011, 11110)   vi. (10101, 11110)

What is the error detection and error correction capability of this scheme?

18 a) Differentiate circuit switching and packet switching.   (5)

b) Describe how the datagram approach allows faster communication than circuit   (5)
switching networks.

19 a) State the principle of spread spectrum technology. How it is different from the   (4)
multiplexing technique?

b) Explain direct sequence spread spectrum with a suitable example.   (6)

20 a) Explain about FHSS with neat sketches and state how it achieves bandwidth   (6)
spreading.

b) An FHSS system uses a 4-bit PN sequence. If the bit rate of the PN is 64 bits per   (4)
second, answer the following questions:

i) What is the total number of possible hops?

ii) What is the time needed to finish a complete cycle of PN?

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