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SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

THIRD SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2023

(2020 SCHEME)

Course Code : 20CST285

Course Name: Data Communication

Max. Marks : 100 **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. List and explain different factors which determine the performance of communication in a network?
2. What is bandwidth? Find the lowest frequency, if a periodic signal has a bandwidth of 20 Hz and the highest frequency is 60 Hz. Draw the Spectrum if the signal contains all frequencies of same amplitude.
3. Transmission characteristics of Fiber Optic cable differs from Coaxial cable. Justify?
4. How the twisting affects performance in twisted pair cable ?
5. Compare Amplitude Shift Keying and Frequency Shift Keying.
6. Distinguish between data rate and signal rate.
7. Discuss wavelength division multiplexing.
8. With a neat sketch discuss the various steps involved in PCM.
9. Differentiate between synchronous and asynchronous data communication.
10. Define different types of errors occur in data transmission with example.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) What are the various transmission impairments and explain how they affect performance of a communication link? (9)

    b) With the help of suitable figures, distinguish between time domain and frequency domain. (5)

OR

12. a) Explain various modes of propagation with suitable diagram and examples. (6)

b) Distinguish between Nyquist bandwidth and Shannon capacity. Consider a noiseless channel with a bandwidth of 3000 Hz transmitting a signal with
(i) Two signal levels and
(ii) Four signal levels. Determine the maximum bit rate in both these cases. (8)

MODULE II

13. a) Briefly discuss Line of Sight Propagation. (5)
b) With the help of suitable diagrams, differentiate Multi-mode and Single-mode optical fibers. How the rays are propagated in Step-index and Graded-index Multi-mode fibers. (9)

OR

14. a) List any four advantages and disadvantages of twisted pair, coaxial cable and fiber optic cable. (9)
b) Write physical and transmission characteristics of Optical Fiber Cable guided transmission media. (5)

MODULE III

15. a) List the different techniques in serial transmission and explain the differences. (5)
b) State Sampling theorem. With help of suitable diagrams, explain the process of transforming analog data in to digital signal using Pulse Code Modulation Technique. (9)

OR

16. a) Define analog transmission and analog to digital conversion. (5)
b) Explain the different line coding schemes with suitable figures. (9)

MODULE IV

17. a) Differentiate between Synchronous TDM and Statistical TDM. Why is a statistical time division multiplexer more efficient than a synchronous time division multiplexer? (9)
b) Explain spread spectrum techniques. (5)

OR

18. a) Discuss wavelength division multiplexing. (5)
b) Explain Frequency Division Multiplexing process. (9)

MODULE V

19. a) Explain the principles of circuit switching. (10)

b) What is the Hamming distance for each of the following codewords:

a. d (10000, 11000)

b. d (10101, 10010) (4)

c. d (11111,11111)

d. d (000, 100)

OR

20. a) Given the data word 100100 and the divisor 1101, show the generation of the CRC code word at the sender side using binary division. (8)

b) With the help of a neat block diagram, explain the structure of a packet switch. (6)

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