

54

- 2013 - 8 - 12 - Dec, 2021



(Pages : 3)

M - 6111

Reg. No. :

Name :

Fourth Semester B.Tech. Degree Examination, December 2021.

13.404 - DATA COMMUNICATION (FR)

(2013 Scheme)

Time : 3 Hours

Max. Marks : 100

PART - A

Answer all questions. Each question carries 4 marks.

1. Mention the purpose of cladding in Optical Fibers
2. Encode the given bit stream using NRZ and NRZ-I 100010001111.
3. What is meant by Transmission impairments?
4. What is the channel capacity for a teleprinter channel with a 300Hz bandwidth and a signal-to-noise ratio of 3dB, where the noise is white thermal noise?
5. Write short notes on Hamming codes.

(5 × 4 = 20 Marks)

PART - B

Answer one full questions from each Module.

Module - I

6. (a) Distinguish between Terrestrial microwaves and Satellite microwaves. 6
(b) What is Bandwidth? A periodic signal has a Bandwidth of 20Hz. The highest frequency is 60Hz. What is the lowest frequency? Draw the spectrum if the signal contains all frequencies of same amplitude. 6
(c) Compare the following
(i) Half duplex and Full duplex transmission
(ii) Synchronous TDM and Statistical TDM. 8

OR

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7. (a) Distinguish between Attenuation and Delay distortion? 6
- (b) What is the thermal noise level of a channel with a bandwidth of 10KHz carrying 1000 Watts of power operating at 50°C. 6
- (c) Explain the structure applications and transmission characteristics of twisted pair and coaxial cable. 8

Module – II

8. (a) Consider a FSK transmitter using a carrier frequency of 500 KHz sending 10Kbps and a frequency deviation of 100 KHz. How much bandwidth is needed for this transmission. Also find the bandwidth for a signal transmitting at 12 Mbps for QPSK. ($\alpha=0$) 8
- (b) List the advantages of using biphase techniques over NRZ schemes for encoding digital data. 8
- (c) Compare Synchronous and Asynchronous transmission. 4

OR

9. (a) With a neat sketch discuss the various steps involved in PCM. 6
- (b) Given the bit pattern 101110001. Encode the stream using BFSK and QPSK. 6
- (c) Explain the various schemes for encoding analog data into analog signals. 8

Module – III

10. (a) (i) Differentiate between Synchronous TDM and Statistical TDM. Why is a statistical time division multiplexer more efficient than a synchronous time division multiplexer. 4
- (ii) Why would you expect a CRC to detect more errors than a parity bit? 4
- (b) Derive the Hamming code for a single bit error correction (For a data of length 7 bit) 8
- (c) Write short notes on WDM. 4



11. (a) In a CRC error-detecting scheme, choose divisor polynomial $P = x^4 + x + 1$. Encode the bits 100100011011. **8**
- (b) Explain about convolution codes in data communication systems. **4**
- (c) What is Frequency Division Multiplexing? How is interference avoided by using FDM? **4**
- (d) What is Forward Error Correction? **4**

Module – IV

12. (a) Explain the following terms:
- (i) DSSS
- (ii) FHSS **8**
- (b) What are the advantages and disadvantages of CDMA? **5**
- (c) Explain the salient features of GPRS. **7**

OR

13. (a) Consider a DS-BPSK spread spectrum transmitter. Let $d(t)$ be a binary sequence 1101, arriving at a rate of 100bps, where left most bit is the earliest bit. Let $c(t)$ be the pseudorandom binary sequence 100110111000 with a clock rate at 300hz. Assuming a bipolar signaling scheme with a binary '0' and binary '1' represented by a signal levels '-1' and '+1' respectively:
- (i) Find the final transmitted binary sequence corresponding to the bipolar signal sequence, $p(t)$
- (ii) What is the bandwidth of the transmitted spread spectrum
- (iii) Calculate the processing gain in dB. **8**
- (b) What are the advantages of packet switching compared to circuit switching? **7**
- (c) Discuss the working of GSM. **5**



(4 × 20 = 80 Marks)

