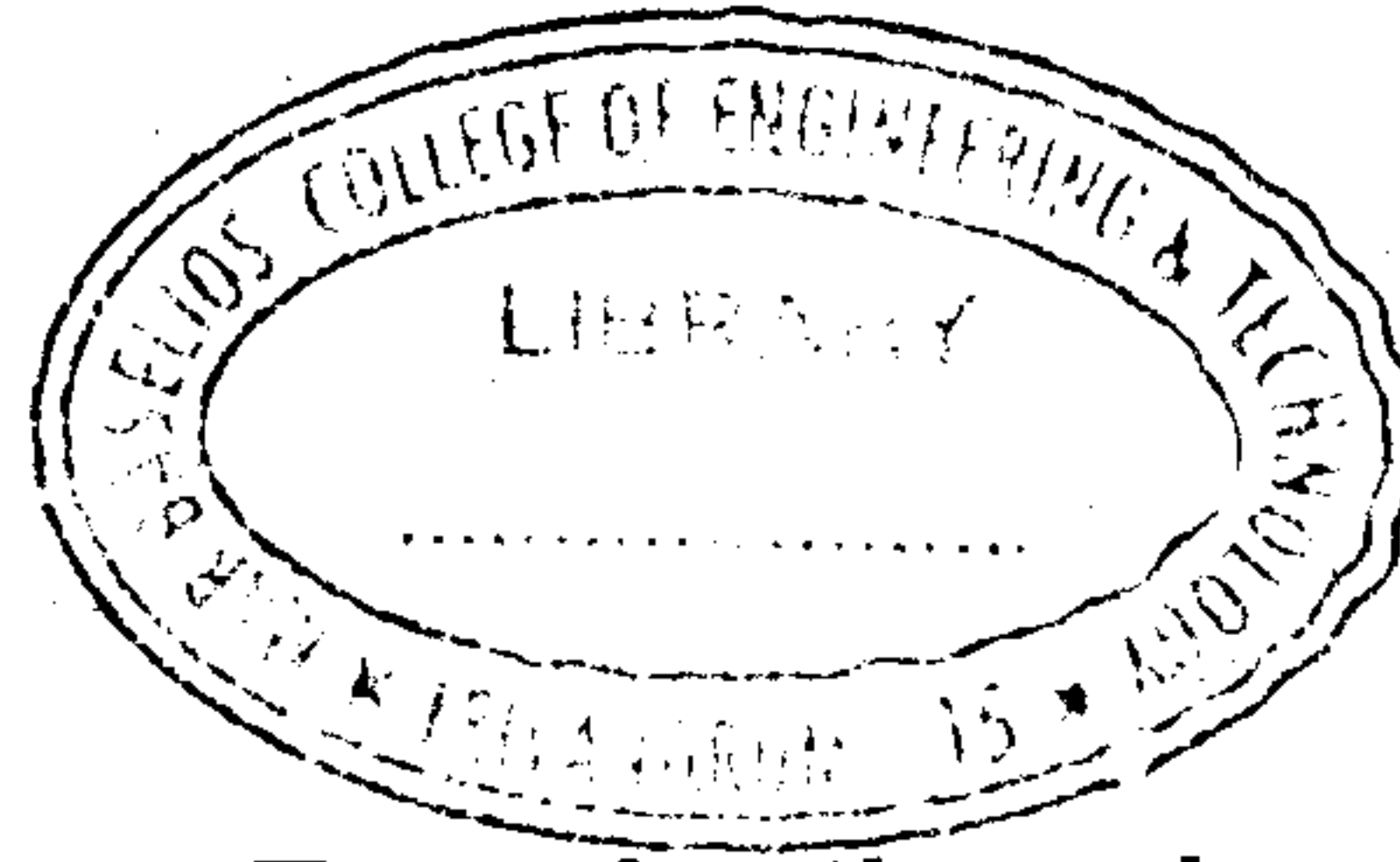


Reg. No. :

Name :



Fourth Semester B.Tech. Degree Examination, June 2019

(2013 Scheme)

13.404 : DATA COMMUNICATION (FR)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries 4 marks.

1. Consider a point-to-point link 50 km in length. At what bandwidth would propagation delay (at a speed of 2×10^8 m/s) equal transmit delay for 100-byte packets? What about 512-byte packets?
2. How does sky propagation differ from line-of-sight propagation? State the features of the wireless transmission medium that is very useful for unicast data communication?
3. What SNR ratio is required to achieve a bandwidth efficiency of 1.0 for ASK, FSK, PSK, and QPSK? Assume that the required bit error rate is 10^6 .
4. A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is $x^3 + 1$. Show the actual bit string transmitted. Suppose the third bit from the left is inverted during transmission, show how this error is detected at the receiver's end.
5. What are the main benefits of spread spectrum system? State how DSSS system benefits from multipath propagation?

(5 × 4 = 20 Marks)

P.T.O.

PART – B

Answer **one** question from each Module. **Each** question carries **20** marks.

Module – I

6. (a) Explain the criteria's used to select an effective and an efficient network. Brief about the network topologies available and cite an advantage for each type and discuss the advantages and disadvantages of multipoint connection over a point—to-point connection? (10)
- (b) Illustrate how the guided media differs from unguided media? Briefly explain any two methods of data transmission using guided media and any two methods of data transmission using unguided media? (10)
7. You have to design a small office network with less than 10 desktop computers. You have to link all the computers to a network printer and fax. For each part of the network, as shown in your diagram, write a few paragraphs describing the part. Select the type of topology, type of cable to be used. If you choose a workgroup or client-server environment, then you have to explain in your report. Your company Internet uses a high speed DSL Internet connection. You also have to explain the vulnerabilities and security measures in your network and Internet. Lastly tabulate the cost of the network. (20)

Module – II

8. (a) Consider a PCM system in which 30 channels are to be time division multiplexed. The bandwidth of each channel is 3 kHz. The sampling rate is 33.33% higher than the theoretical minimum and 8 bits are used for each sample. Determine the required bit rate and find the minimum required transmission bandwidth. (10)
- (b) A binary digital carrier system with average transmitted power 100 mW has to be designed for the worst case transmission loss of 60 dB, and $12 \times 10^{-10} \text{ No} = \text{W/Hz}$. Find the maximum allowable bit rate for a BER = 10^{-5} using: (i) BPSK (ii) DBPSK (iii) noncoherent BFSK. (10)

9. (a) Digital data at 100 kbps is transmitted over an AWGN channel with a power spectral density 10^{-10} W/Hz. Calculate the average received power required to achieve a BER = 10^{-6} for the following modulation schemes: (i) Coherent Binary ASK (ii) Coherent Binary PSK and (iii) Coherent Binary FSK. (10)
- (b) Explain the three basic modulation techniques for transforming digital data into analog signals with waveforms. (5)
- (c) Find the minimum bandwidth for a ASK signal transmitting at 2 Kbps. Assume the transmission mode is half-duplex and that $r=0$. (5)

Module – III

10. (a) List atleast three techniques used for error detection and correction. Discuss any one of them in detail with an example. (10)
- (b) Explain with block diagram what is synchronous TDM? (5)
- (c) How is WDM similar to FDM? Give their differences. (5)
11. (a) Find the CRC code for a frame (message) 1010001101 and generator polynomial
- $$G(X)=X^5+X^4+X^2+ 1 \quad (5)$$
- (b) Consider the synchronous time-division-multiplexing of 8 1-Mbps digital signals. The output frame is composed of 64 blocks of user data and each block is formed by interleaving one bit from each input line. Assume that the multiplexer adds 1 framing byte to each frame to facilitate demultiplexing operation at the receiver. Illustrate the TDM output frame format. Determine the input bit duration. Determine the output bit duration. (10)
- (c) Differentiate block codes and convolution codes (5)



Module – IV

12. (a) What is circuit switching? Discuss how packet switching is better than circuit switching for computer to computer communication (5)
- (b) What are the benefits of polling in a wireless network? Discuss with an example the polling mechanism used in Wireless LANs that uses CDMA in one of the stages. (15)
13. (a) State the difference between direct sequence spread spectrum technique and frequency spread spectrum technique with an example? (10)
- (b) Explain the architecture of GSM with a neat block diagram (10)

