

L1B
3/12/13 FN

Reg. No. :

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

Question Paper Code : 75431

5 Year M.Sc. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Elective

Computer Technology

ECT 502/ESE 043 — PRINCIPLES OF DATA COMMUNICATION

(Common to 5 Year M.Sc. Software Engineering)

(Regulation 2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the characteristics needed for any data communication system?
2. Define Sampling theorem.
3. State the reason, why base 2 logarithms are used to measure information?
4. What is meant by coding efficiency?
5. What is white noise? Give an example.
6. A signal has a fundamental frequency of 1000 Hz. What is its period?
7. Compare PCM with DM.
8. State the advantages of biphase schemes.
9. What is the purpose of splitting the large block of data into smaller blocks?
10. Define upstream and downstream with respect to subscriber lines.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What is the purpose of modem and discuss about the different types of modems used for preparing data transmission. (10)
- (ii) Write short notes on AM, FM and PM. (6)

Or

- (b) (i) Explain about Pulse Amplitude modulation. (6)
- (ii) Derive and explain AM Modulated signal with relevant waveforms and notations and draw the frequency spectrum of AM. (10)
12. (a) (i) Using Shannon's theorem, compute the maximum bit rate for a channel having bandwidth of 3100 Hz and signal-to-noise ratio 20 dB and calculate the number of levels required to transmit the maximum bit rate. What is the baud rate? (8)
- (ii) Explain in detail about the channel classification. Give the channel capacity of each channel. (8)

Or

- (b) (i) Determine the average length and entropy for the messages (8)
- Messages : X1 X2 X3 X4 X5 X6 X7 X8 X9 X10
- Prob's : 0.18 0.17 0.16 0.15 0.10 0.08 0.05 0.05 0.04 0.02
- (ii) Write short notes on
- (1) Algebraic codes
- (2) Convolution Codes. (8)
13. (a) Discuss in detail about analog and digital data transmission. (16)

Or

- (b) (i) Explain about the three most significant transmission impairments. (8)
- (ii) Describe about asynchronous and synchronous transmission. (8)
14. (a) (i) Draw FSK transmitter and receiver block diagrams and explain the functions of each block. (10)
- (ii) What is the bandwidth efficiency for FSK, ASK, PSK and QPSK for a bit error rate of 10^{-7} on a channel with an SNR of 12 dB. (6)

Or

- (b) Discuss about the various levels of Phase Shift Keying. (16)
15. (a) (i) What are the basic characteristics of high level data link control. (8)
- (ii) Two neighboring nodes A and B use a sliding window protocol with a 3-bit sequence number. As the AQR mechanism, go-back-N is used with a window size of 4. Assuming A is transmitting and B is receiving, Show the window positions for the following succession of events : (8)

- (1) Before A sends any frames
- (2) After A sends frames 0,1 ,2 and receives acknowledgement from B for 0 and 1.
- (3) After A sends frames 3,4, and 5 and B acknowledges 4 and the ACK is received by A.

Or

- (b) (i) Twenty-four voice signals are to be multiplexed and transmitted over twisted pair. What is the bandwidth required for FDM? Assuming a bandwidth efficiency of 1 bps/Hz, what is the bandwidth required for TDM using PCM? (8)
- (ii) A company has two locations: A headquarters and a factory about 25 km away. The factory has four 300-bps terminals that communicate with the central computer facilities over leased voice-grade lines. The company is considering installing TDM equipment so that only one line will be needed. What cost factors should be considered in the decision? (8)