Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 52860

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Third/Fourth Semester

Computer Science and Engineering

CS 6304 — ANALOG AND DIGITAL COMMUNICATION

(Common to Biomedical Engineering/Information Technology)

(Regulation 2013)

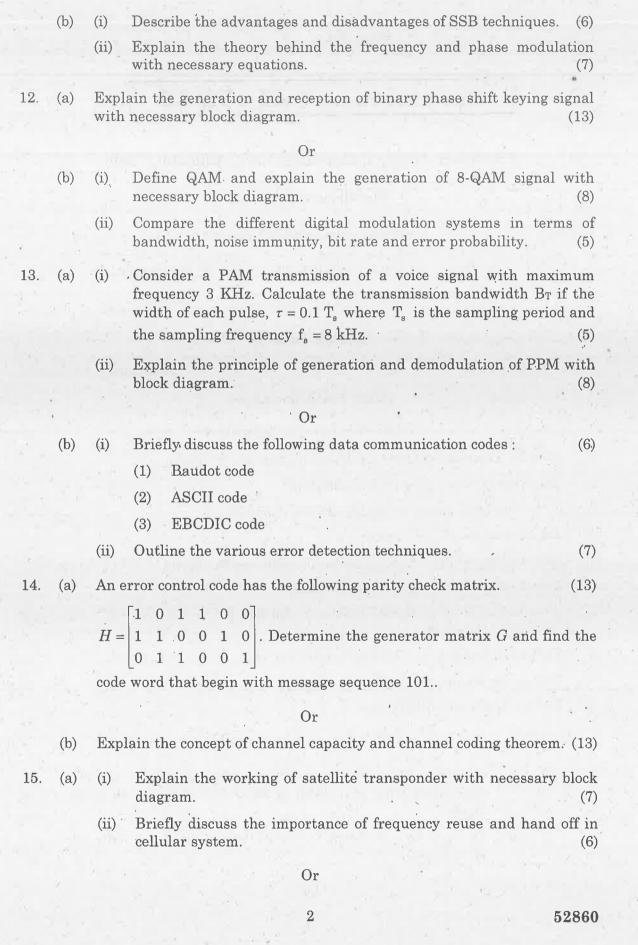Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   Identify external and internal noise in communications.

2.   State the advantages of FM modulation.

3.   Draw the FSK signal for the bit stream 0101010.

4.   Define Bandwidth efficiency.

5.   List out the different types of data communication codes.

6.   Recall types of pulse analog modulation.

7.   A source of four messages with probabilities { 1/8, 3/8, 3/8, 1/8 }. Find the entropy of the source.

8.   Differentiate block code over convolution code.

9.   Define the advanced mobile phone system.

10. Define Bluetooth technology.

PART B — (5 × 13 = 65 marks)

11. (a) (i)   A receiver connected to an antenna whose resistance is 50 Ω has an equivalent noise resistance of 30 Ω. Calculate the receiver's noise figure.   (5)

         (ii) Enumerate the theory of amplitude modulation with necessary waveforms.   (8)

Or

(b) (i) Describe the advantages and disadvantages of SSB techniques. (6)

(ii) Explain the theory behind the frequency and phase modulation with necessary equations. (7)

12. (a) Explain the generation and reception of binary phase shift keying signal with necessary block diagram. (13)

Or

(b) (i) Define QAM and explain the generation of 8-QAM signal with necessary block diagram. (8)

(ii) Compare the different digital modulation systems in terms of bandwidth, noise immunity, bit rate and error probability. (5)

13. (a) (i) Consider a PAM transmission of a voice signal with maximum frequency 3 KHz. Calculate the transmission bandwidth B_T if the width of each pulse, $\tau = 0.1\, T_s$ where T_s is the sampling period and the sampling frequency $f_s = 8$ kHz. (5)

(ii) Explain the principle of generation and demodulation of PPM with block diagram. (8)

Or

(b) (i) Briefly discuss the following data communication codes : (6)

(1) Baudot code

(2) ASCII code

(3) EBCDIC code

(ii) Outline the various error detection techniques. (7)

14. (a) An error control code has the following parity check matrix. (13)

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}.$$ Determine the generator matrix G and find the

code word that begin with message sequence 101..

Or

(b) Explain the concept of channel capacity and channel coding theorem. (13)

15. (a) (i) Explain the working of satellite transponder with necessary block diagram. (7)

(ii) Briefly discuss the importance of frequency reuse and hand off in cellular system. (6)

Or

(b) Explain the working principle of the following systems.

    (i)   Code division multiple access techniques. (6)

    (ii) Global system for mobile communications. (7)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Outline the basic principle of Huffman code (5)

       (ii) Perform a case study on Huffman codes for the given message symbols {a1, a2, a3, a4, a5} with probabilities {0.2, 0.1, 0.05, 0.6, 0.05} respectively. (10)

Or

(b) In a digital communication system, the bit rate of NRZ data stream is 1 Mbps and carrier frequency of transmission is 100 MHz. Determine the symbol rate of transmission and bandwidth requirement of the channel in the following cases of different techniques used. (15)

    (i)   BPSK system

    (ii) QPSK system

    (iii) 16-ary PSK system.

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