

(3 Hours)

[Total Marks : 80]

- N.B.: (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

- 1** Attempt any FOUR [20]
- a** What is modulation? What are the types of modulation?
 - b** Explain different error control systems
 - c** Compare BASK, BPSK, BFSK, 4-ary FSK and 8-ary PS in terms of bandwidth
 - d** Calculate 4-bits checksum for the data 110011111011
 - e** Calculate CRC bits for the data 10000 using $g(x) = x^8 + x^2 + x + 1$
- 2 a** Explain Shannon-Hartley Theorem and determine the channel capacity if the bandwidth is infinite [10]
- b** Write the algorithms for determining Huffman code and Shannon-Fano code and select a suitable example to show the code generation [10]
- 3 a** What is line code? What are the parameters need to be considered for selecting a line code for a specific allocation. [10]
- b** Draw the shift register circuit for (7,4) systematic cyclic code encoder with $g(x) = x^3 + x^2 + 1$ and generate parity bits for the data 1000 and 1010 [10]
- 4 a** Explain error detection and correction procedure for systematic linear block code [10]
- b** Derive the PSD of QPSK signal, draw the power spectrum and find the bandwidth [10]
- 5 a** Sketch the signal space diagram of MSK and determine the error probability [10]
- b** Explain 16-ary QASK modulator and demodulator with suitable equations [10]
- 6 a** Show that the performances of matched filter and correlator are identical [10]
- b** Explain Viterbi's decoding algorithm with a suitable example [10]