

TE sem IV c/scheme summer 2025

Time: 3 Hours

Marks: 80

N.B.: (1) Question No 1 is Compulsory.

EXTC

(2) Attempt any three questions out of the remaining five.

3/6/25

(3) Assume suitable data wherever necessary.

(4) Figures to the right indicate full marks.

- 1 Attempt any FOUR
- a What is modulation? What are the types of modulation? [5]
- b Explain different error control systems. [5]
- c Compare BASK, BPSK, BFSK, 4-ary FSK and 8-ary PSK in terms of bandwidth. [5]
- d Calculate 4-bits checksum for the data 110011111011 [5]
- e Calculate CRC bits for the data 10000 using  $g(x) = x^8 + x^2 + x + 1$  [5]
- f Describe Integrate and dump receiver. [5]
- 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 parameters need to be considered for selecting a line code for a specific application? [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 the 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]