

03/06/2025 TE EXTC SEM-V C-SCHEME DC QP CODE: 10080140

Time: 3 Hours

Marks: 80

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

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

(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]