

Code: EC6T4

**III B.Tech-II Semester–Regular/Supplementary Examinations–March 2019**

**DIGITAL COMMUNICATIONS  
(ELECTRONICS & COMMUNICATION ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

**PART – A**

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1.

- a) What is the need of source coding?
- b) What is meant by Correlative coding?
- c) Give the properties of matched filter.
- d) Explain the operation of DPSK.
- e) Draw the block diagram of non-coherent FSK?
- f) What is meant by fast frequency hopping?
- g) What is meant by Jamming margin?
- h) A voice grade channel of the telephone network has a bandwidth of 3.4KHz. Calculate the information capacity of the telephone channel for a signal-to-noise ratio of 30dB.
- i) List out the properties of mutual information.
- j) Draw an encoder for an (n,k) cyclic code.
- k) Define Code rate and Constraint length of Convolutional encoder.

## PART – B

Answer any *THREE* questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Explain Adaptive Delta modulation in detail with suitable diagram. 8 M
- b) A PCM system uses a uniform quantizer followed by a  $v$  bit encoder. Show that rms to quantization noise is approximately given as  $(1.8 + 6v)$  dB. 8 M
3. a) Explain the Gram Schmidt Orthogonalization procedure. 8 M
- b) Explain the generation and detection of Quadrature Phase Shift Keying. 8 M
4. a) Explain the direct-sequence spread spectrum with coherent Binary Phase Shift Keying. 10 M
- b) A DSSS system transmits at a rate of 1000 bits/sec in the presence of a tone jammer. The average jammer power is 20 dB greater than the average desired signal power. Find the required  $E_b/J_0$  to achieve satisfactory performance is 10 dB. 6 M

5. a) Explain the Information Capacity theorem. 10 M

b) In a Discrete Memoryless Source  $X$  with four symbols

$x_1, x_2, x_3$  and  $x_4$  with corresponding probabilities

$P(x_1) = 0.5, P(x_2) = 0.25, P(x_3) = 0.125$  and  $P(x_4) = 0.125$ .

Calculate the efficiency using Shannon-fano code.

6 M

6. a) The generator polynomial of (7, 4) cyclic code is

$G(p) = p^3 + p + 1$ . Find code vectors for 0101, 0111, 1100, 1111 in non systematic form. 6 M

b) Code rate  $1/3$  convolution code with constraint length of

'3' uses the generating vector  $g_1 = (1 \ 0 \ 0)$ ,  $g_2 = (1 \ 0 \ 1)$  and  $g_3 = (1 \ 1 \ 1)$ .

i) Sketch the encoder configuration

ii) Draw code tree, trellis and state diagram. 10 M