H.T.No. | | | | | | | | | | |

Code No: EC1530 **GEC-R14**

III B. Tech I Semester Regular/Suppl. Examinations, November 2017

DIGITAL COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 Hours **Max. Marks: 60**

Note: All Questions from **PART-A** are to be answered at one place.
Answer any **FOUR** questions from **Part-B.** All Questions carry equal Marks.

PART-A

6 × 2 = 12M

1. Discuss about the different noise effects in Delta Modulation.
2. What are the similarities between BPSK and BFSK?
3. Explain baseband receiver with neat diagrams.
4. Verify that I(X;Y)=I(Y;X).
5. What are the conditions to be satisfied by Hamming code?
6. What are the advantages of convolutional codes compared to linear block codes?

PART-B

4 × 12 = 48M

1. a) Compare PCM and DM Systems. (8M)

   b) A given DM system operates with a sampling rate f_s and fixed step size Δ. If the input to the system is m (t) = α t for t>0. Determine the value of α for which slope over load occurs. (4M)

2. a) Explain the working of a Differential PSK (DPSK) with the help of a neat block diagram. (6M)

   b) Draw the block diagram of coherent BFSK receiver and explain its operation. (6M)

3. a) Show that the impulse response of a matched filter is a time reversed and delayed version of the input signal. (6M)

   b) Coherent orthogonal Binary FSK modulation is used to transmit two equiprobable symbol waveforms $s_1(t)$ =Acos2$\pi f_1 t$ and $s_2(t)$=Acos2$\pi f_2 t$, where A is 4 mV. Assume an AWGN channel with noise power spectral density $N_0/2=0.5\times10^{-12}$ W/Hz. Using an optimal receiver and the relation. (6M)

$$Q(v) = \frac{1}{\sqrt{2\pi}} \int_v^\infty e^{-\frac{u^2}{2}} du$$

   What is the bit error probability for a data rate of 5000 Kbps?

4. a) An analog signal is band limited to 4KHz, sampled at the nyquist rate, and the samples are quantized into 4 levels. The quantization levels Q_1, Q_2, Q_3 and Q_4 (messages) are assumed independent and occur with probabilities $p_1= p_4=1/8$ and $p_2= p_3=3/8$. Find the information rate R of the source. (6M)

   b) Explain the concept of amount of information and its properties. (6M)

5. a) The generator polynomial of a (7, 4) Binary Cyclic code is defined by $g(x)=1+x^2+x^3$. Develop the encoder for this code. (6M)

   b) Develop syndrome calculation decoder for this code and explain operation. (6M)

6. a) A particular convolutional code is described as an (n, k, L) code. What do these letters n, k and L represent? Explain. (3M)

   b) The generators of a 1/3 rate convolutional code are: g1=[1 0 0]; g2=[1 0 1] and g3=[1 1 1]. Draw the encoder circuit, state and Trellis diagrams corresponding to this code. (9M)

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