C 28825

Name.....

Reg. No.....

# SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, JUNE 2012

## EC 2K 603—DIGITAL COMMUNICATION

Time : Three Hours  Maximum : 100 Marks

*Answer* **all** *questions.*

1. (a) A voice grade channel of the telephone network has a bandwidth of 3 kHz. Calculate the channel capacity of the telephone channel for a SNR of 30 dB. Also calculate the minimum SNR required to support information transmission through the telephone channel at the rate of 4800 bits per second.

   (b) What are the disadvantages of DM ? How it is overcome ?

   (c) Construct the duobinary coder output for the binary data 001101001. Suppose that due to error during transmission, the level of the receiver input produced by the second digit is reduced to zero. Construct the receiver output.

   (d) Explian the geometric structure of the signal space.

   (e) Explain about correlation receiver.

   (f) State and explain any *two* properties of Guassian Random process.

   (g) Comment on the bandwidth efficiency of M-ary PSK nd M-ary FSK signal.

   (h) Find the average carrier power required to maintain an average $Pe \leq 10^{-4}$ for coherent binary FSK scheme, if data rate over a microwave link is $10^6$ bits/sec and psd of noise at the receiver input is $10^{-10}$ W/Hz. Determine the channel bandwidth.

   (8 × 5 = 40 marks)

2. (a) Derive the expression for quantization noise and SNR of PCM system.

   *Or*

   (b) Discuss the operation of PAM/TDM and DPCM system.

3. (a) Discuss the Nyquist criteria for distortionless baseband binary transmission.

   *Or*

   (b) Describe briefly about Gram-Schmidt orthogonalization procedure.

4. (a) Explain the properties of Guassian random process and MAP detector.

   *Or*

   (b) Design the optimum receiver and determine the error probability for a binary data transmitted using polar signalling over an AWGN channel with niose PSD N/2. The two signals used are :

   $s_1(t) = -s_2(t) = \sqrt{E}\,\phi(t)$

   The symbol probabilities P $(m_1)$ and P $(m_2)$ are unequal.

5. (a) Discuss briefly about the power spectra of PSK, FSK, QPSK, MSK and M-ary signals.

   *Or*

   (b) Derive the expression for bit error probability for M-ary PSK and MSK signals.

   (4 × 15 = 60 marks)