

Code: 9A04601

**R09**

B.Tech III Year II Semester (R09) Supplementary Examinations May/June 2016

**DIGITAL COMMUNICATIONS**

(Electronics and Communication Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions  
All questions carry equal marks

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- 1 (a) What is Companding? Explain the process in digital communications.  
(b) Explain in detail about  $\mu$ -law and A-law.  
(c) Show that for  $\mu = A$ , the  $\mu$ -Law and A-Law have the same companding gain.
- 2 (a) Derive an expression for channel noise and quantization noise in DM system?  
(b) The pulse rate in a DM system is 56,000 per second. The input signal is  $5\cos(2\pi 1000t) + 2\cos(2\pi 2000t)$  volts, with  $t$  seconds. Find the minimum value of step size which will avoid slope overload distortion. What would be the disadvantages of choosing a value greater than the minimum?
- 3 (a) With the help of a block diagram explain Baseband Binary data transmission system.  
(b) Binary data is transmitted at the rate of 112 kbps using a baseband binary PAM system designed to have a raised cosine spectrum. What is the transmission bandwidth required if the roll off factor  $\rho = 0.2, 0.45$ ?
- 4 (a) With the help of a block diagram explain Duobinary signaling scheme.  
(b) Explain about modified Duobinary signaling.  
(c) What is Correlative level coding?
- 5 (a) What are the properties of linear block codes? Give the mathematical description of linear block codes.  
(b) Define syndrome and explain its properties.
- 6 (a) Derive an expression for coding efficiency.  
(b) Derive an expression for channel capacity in terms of signal power, noise power and bandwidth of the channel.
- 7 (a) Derive an expression for the probability of bit error in a coherent binary PSK system.  
(b) Binary data is transmitted at a rate of  $10^6$  bits/sec over a microwave link having a bandwidth of 3 MHz. Assume that the noise power spectral density at the receiver is  $\frac{\eta}{2} = 10^{-10}$  watts/Hz. Find the average carrier power required at the receiver end for the coherent PSK and DPSK signaling schemes to maintain  $P_e \leq 10^{-4}$ .
- 8 Draw the block diagram of QPSK modulator and explain each block in detail.

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