

Roll No : .....

# *National Institute of Technology, Delhi*

Name of the Examination: B. Tech.

Branch : ECE Semester : V  
Title of the Course : Digital Communication Course Code : ECB-303

Time: 3 Hours

Maximum Marks: 50

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## Section A

Note: Attempt ALL Questions. Each question carries equal marks.

- Q: 1 A band pass signal has the spectral range of 20 kHz to 82 kHz. The acceptable range of sampling frequency is  
(a) 40 to 164 kHz (b) 40 to 164 Hz (c) 10 to 41 kHz (d) 10 to 41 Hz
- Q: 2 The SNR of a PCM system having  $2^8$  number of quantization levels is  
(a) 5.28 dB (b) 52.8 dB (c) 0.528 dB (d) 528 dB
- Q: 3 The Nyquist rate for a signal  $x(t) = 5 \cos(2\pi \times 500 t)$  is  
(a) 1200 Hz (b) 1000 Hz (c) 2000 Hz (d) 1400 Hz
- Q: 4 Power Spectral Density is a \_\_\_\_\_ function of frequency.  
(a) Discrete (b) Continuous (c) Any of (a) & (b)
- Q: 5 The dc level of which format is always zero?  
(a) Unipolar NRZ (b) Polar RZ (c) Manchester (d) AMI
- Q: 6 The quantization error in PCM system possess following distribution  
(a) Gaussian (b) Uniform (c) Normal (d) Poissons
- Q: 7 A Gaussian channel has 1 MHz bandwidth and SNR = 9 dB. The channel capacity is:  
(a) 1 Mbps (b) 2 Mbps (c) 3Mbps (d) 10 Mbps
- Q: 8 The Fourier transform of  $\text{rect}(t/T)$  is  
(a)  $\text{Sin}(fT)$  (b)  $\text{Sinc}(fT)$  (c)  $T \text{Sin}(fT)$  (d)  $T \text{Sinc}(fT)$
- Q: 9 Bandwidth of MSK (Minimum Shift Keying) is  
(a)  $f_b$  (b)  $2f_b$  (c)  $1.5 f_b$  (d)  $f_b/2$
- Q: 10 The height of the eye opening of an eye pattern defines  
(a) Jitter (b) Time Interval (c) Noise Margin (d) Sensitivity to timing errors

(10\*1=10)

### Section B

**Note: Attempt Any FOUR Questions. Each question carries equal marks.**

- Q: 1 A TV signal with a bandwidth of 4.2 MHz is transmitted using binary PCM. The number of quantization levels is 512. Calculate:
- (i) Code word length
  - (ii) Transmission Bandwidth
  - (iii) Final bit rate
  - (iv) Output signal to quantization noise ratio in dB
- Q: 2 Explain Maximum Likelihood Receiver Structure for Digital Communication System. Derive the expression for Error Probability.
- Q: 3 Compare and Contrast all Line coding Techniques; taking at least 5 parameters. How line code are different from the source codes.
- Q: 4 "MSK is Special case of FSK". Justify the statement along with its Transmitter Structure.
- Q: 5 Explain different types of distortions in Delta Modulation along with its causes and remedies.
- (5\*5=25)

### Section C

**Note: Attempt Any TWO Questions. Each question carries equal marks.**

- Q: 1 Explain the working of QPSK Technique with transmitter and receiver structure in detail. What is the advantage of QPSK over BPSK?
- Q: 2 Explain the concept of Match Filter. Derive the optimum value of transfer function of this filter.
- Q: 3 Write short notes on following:
- (i) Companding
  - (ii) PCM Transmission Path
- (3\*10=30)

\*\*\*\*\*All the Best\*\*\*\*\*