G 453 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Electronics and Communication Engineering

DIGITAL COMMUNICATION TECHNIQUES (L)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

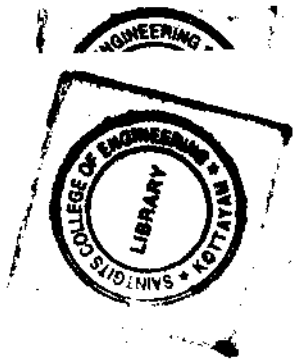
Part A

Answer **all** *questions briefly.*
Each question carries **4** *marks.*

1. With suitable examples, explain random variable and random process.
2. Explain what do you mean by stationarity and ergodicity with respect to random process ?
3. With neat diagram, give the significance of eye pattern.
4. For the binary 01101001, draw the following coding schemes :
   (a) ON-OFF keying. (b) Bipolar signaling.
   (c) Manchester code. (d) Non-return to zero signaling.
5. For the binary data 10010011, represent the DISK version. Assume $d_{-1} = 0$.
6. Differentiate between QPSK and MSK signaling schemes.
7. Find the output signal-to-noise ratio in delta modulated system for a 1kHz sinusoid, which is sampled without slope overload ? The bandwidth of the reconstruction filter used in 4kHz.
8. What do you mean by quantization and quantization error ? Explain.
9. Explain the concept of maximum likelihood estimation ? Where it is used ?
10. A binary data is transmitted using ASK over an AWGN channel at a rate 2.4 MBPS. The carrier amplitude at the receiver is 1 mV. Noise power spectral density is $\frac{N_o}{2} = 10^{-15}$ W/Hz. Find the average probability of error Take *erfc* (5) = 3×10^{-6}.

(10 × 4 = 40 marks)

Turn over



Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Explain clearly Nyquist's criterion for distortionless base band transmission.

Or

12. (a) A function is expressed as $f(x) = \begin{cases} c(x^2+1) & 1 < x < 3 \\ 0 & \text{elsewhere} \end{cases}$

(i) Find the value of c for $f(x)$ to be a density function.

(ii) Find the probability that x lies between 1 and 2.

(b) Define joint distribution function. Explain its various properties.

13. (a) Discuss the merits and demerits of duobinary signalling. (5 marks)

(b) Show how duobinary decoding is done when the input $\{D(K)\} = \{010101.....\}$ is

(i) Precoded ; (ii) not precoded.

(ii) Show in each case what happens if the fourth bit detected wrongly.

(7 marks)

Or

14. (a) Explain adaptive equalisation with a neat block diagram. (6 marks)

(b) Differentiate scambling and descrambling. (6 marks)

15. Draw the block diagram of coherent M-ary FSK transmitter and receiver and also explain in detail the signal space diagram.

Or

16. With neat diagrams explain :

(a) Coherent MSK transmitter and receiver.

(b) Coherent QPSK transmitter and receiver. Also draw the corresponding waveforms.

17. (a) What is quantization ? Explain with neat waveforms, two types of quantization.

(b) Draw the block diagram showing the basic elements of PCM system and explain the importance of each element in the system.

Or

18. A delta modulation system is designed to operate at 3 times the Nyquist rate for a signal with 3 kHz bandwidth. The quantizing step size is 250 mV.

    (i) Determine the maximum amplitude of a 1kHz input sinusoidal for which the delta modulator does not show slope overload.

    (ii) Determine the post filtered output SNR for the signal of (i)

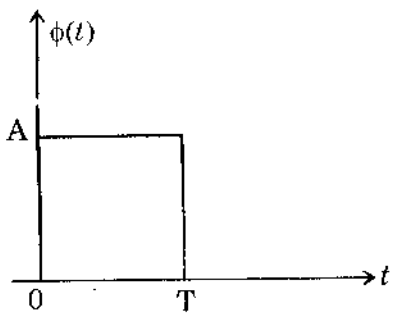
19. Draw and explain the block diagram of a correlation receiver. Derive an expression for the response of the bank of correlation receiver to noisy input.

Or

20. The figure below shows a finite energy signal $\phi(t)$:

    (i) Sketch the impulse response $h_{opt}^{(t)}$ of optimum filter matched to $\phi(t)$.

    (ii) Determine the value of the output of matched filter at t = T assuming noise is zero and input is $\phi(t)$.



(5 × 12 = 60 marks)