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Reg. No. : .....

Name : .....

Sixth Semester B.Tech. Degree Examination, March 2015
(2008 Scheme)
08.604 : DIGITAL COMMUNICATION (T)
(Special Supplementary)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions from Part **A**.

1. State the useful information obtained from eye pattern. Draw the eye pattern of a quaternary baseband PAM system and explain.

2. A binary PAM wave is required to be transmitted over a pair of copper wires with an absolute bandwidth of 75 kHz. The bit duration is equal to10 μm. Find the roll factor of a raised cosine pulse spectrum that satisfies their requirements.

3. Define non-uniform sampling. How this is achieved in practice ?

4. A modulating signal is given by $x(t) = A \tanh(\beta t)$. Find the maximum value of A for no slope overload distortion. Take step size = 2 mV and sampling rate fs = 10 kHz.

5. State maximum aposteriori probability rule.

6. Draw the geometric representation of signals where N = 2 M = 3. Also obtain a synthesiser for generating the signals $S_i(t)$ and analyses for generating signal vectors $\{S_i\}$.

7. What are the multiple access method ? Compare them.

8. A 3 stage shift register with a linear feedback generates the sequence. 01011100101110.

   a) Determine the period of the given infinite sequence.

   b) State and prove the run property.

P.T.O.

9. A fast FH/MFSK has the following parameters

   The number of bits per MFSK signal = 4.

   The number of hops per MFSK symbol = 4.

   Calculate the processing gain.

10. In a direct sequence spread spectrum modulation it is required to have a jamming margin greater than 26 dB. The ratio Eb/No is set to 10. Determine the minimum processing gain.

PART – B

Answer **any 2** questions from **each** Module.

Module – 1

11. a) Derive the expression for output signal to noise ratio of uniform quantiser with i/p signal being sinusoidal of maximum amplitude A.

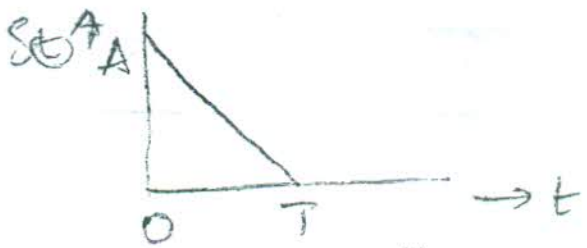
    b) A PCM system uses a uniform quantiser followed by a 7 bit encode. The bit rate of the system is 50 Mbps.

       a) What is the message bandwidth ?

       b) Determine output SNR when input signal is sinusoidal modulating wave of frequency 1MHz ?

12. What ISI ? Derive the Nyquist criterion for distortionless base band binary transmission. State the techniques by which ISI can be reduced.

13. a) The finite energy signal s(t) is shown.



    Sketch the impulse response $h_{opt}^{(t)}$ of optimum filter matched to signal g (t). Also determine the value of the output signal at t = T.

    b) State any two properties of matched filter.

Module – 2

14. a) Derive the mathematical relationship between the correlation receiver and matched filter.

    b) A binary baseband digital communication employs the signal

$$S(t) = \frac{1}{\sqrt{Ts}} \quad 0 \le t \le Ts$$
$$= 0 \text{ otherwise}$$

    Determine the output if the signal is passed through a correlator.

15. With relevant block schematics explain the two equivalent forms of the quadratic receiver.

16. a) Derive the error probability of a QPSK system.

    b) Binary data are transmitted at a rate of 10^6 bps. Let the channel noise is AWGN with power spectral density at the receiver input is 10^{-10} watts per Hz. Find the average power required to maintain an average probability of error $P_e \le 10^{-4}$ for coherent BFSK. Given erf (2.5) = 0.99959, erfc (2.8) = .9998.

Module – 3

17. a) A Pseudo-noise (PN) sequence is generated using a feedback shift register of length m = 4. The chip rate is 10^7 chips per second. Find the following parameter.

        i) PN sequence length
        ii) Chip duration of the PN sequence
        iii) PN sequence period.

    b) What are Gold codes ? What advantages they hold over PN sequence ?

18. a) Derive the expression for Jamming margin for a direct-sequence spread spectrum.

    b) With a block diagram explain direct sequence spread spectrum transmitter and receiver.

19. List the type of source coding of speech for wireless communication. What are their advantages ? With a block diagram explain any one speech codes used for wireless communication.