SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act, 1956)

Course & Branch: B.E. / B. Tech – CSE/IT
Title of the paper: Principles of Communication Engineering
Semester: III Max. Marks: 80
Sub.Code: 11307/12307 (2002/2003) Time: 3 Hours
Date: 22-04-2007 Session: AN

PART – A (10 x 2 = 20)

Answer ALL the Questions

1. Define Noise figure
2. State the properties of Autocorrelation
3. Find the Modulation Index if a 10V carrier is Amplitude modulated by three different frequencies with amplitudes of 1V, 2V and 3V respectively.
4. What is Capture Effect?
5. What is meant by Companding?
6. What is meant by Aliasing effect?
7. Draw the Constellation diagram for QPSK modulation scheme.
8. State the Merits and Demerits of using M-ary modulation schemes
9. Define Entropy
10. What are the properties of a Cyclic code?

PART – B (5 x 12 = 60)

Answer All the Questions

11. (i) Define Autocorrelation and state down it's properties. (4)
(ii) A Stationery random process X(t) has the autocorrelation function

$$R_x(\tau) = \begin{cases} 2e^{-2\tau} & \text{for } \tau \geq 0 \\ 0 & \text{for } \tau < 0 \end{cases}$$

Find the power spectral density of X(t). (8)

Or

12. (i) Write down the classification of signals and give example for each of them (6)
    (ii) What are the various types of noise that are to be considered in communication and also mention it's effect? (6)

13. Am AM wave is given by
    $V_{am}(t)=5\cos 25000\pi t(1+0.5\cos 2000\pi t+0.5\cos 4000\pi t+\cos 6000\pi t)$
    i) Find out the various frequency components that are contained in the above AM wave.
    ii) Find the Modulation Index
    iii) Calculate the minimum needed Bandwidth
    iv) Calculate the Power in each side bands (3+3+3+3)

Or

14. With a neat diagram explain how Frequency demodulations can be performed using Foster-Seeley discriminator. (12)

15. Show that if the sampling rate is greater than or equal to twice the highest message frequency, the message signal m (t) can be recovered from the sampled signal by Low-pass filtering.(12)

Or

16. (i) With a neat diagram explain the working principle of Delta Modulator. (6)
    (ii) Sketch the waveforms for the following input data "1 0 1 0 1" if is encoded by the following formats : Unipolar and Polar. (6)

17. Explain the operation of a BPSK communication system with a neat Block diagram and derive the expression for the probability of error. (12)

Or

18. Explain the operation of an M-ray FSK communication system with a neat diagram and compare it's performance with BFSK modulation using various characteristics. (12)

19. The Generator Matrix for a (7,3) systematic binary linear block code is given by

$$G = \begin{pmatrix} 1 & 1 & 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 & 1 \end{pmatrix}$$

(i) Determine the Parity check matrix for this code
(ii) What is the mini mum distance of the code?
(iii) Draw the encoder circuit (3+3+6)

Or

20. Explain in detail about Direct Sequence Spread Spectrum Modulation system with a neat diagram.