

II B.Tech II Semester Supplementary Examinations, Apr/May 2006
COMMUNICATION THEORY
(Information Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Write the exponential form of the Fourier series and give the application of the same in communication theory.
- (b) Find the trigonometric Fourier series of the rectified sine wave shown in figure 1 below. [10+6]

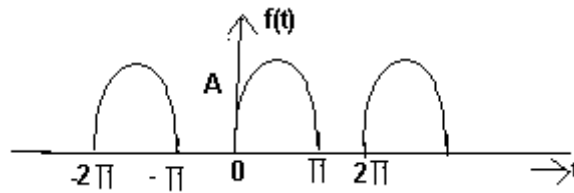


Figure 1:

2. (a) What is meant by autocorrelation. Explain with example.
- (b) Prove that the power spectral density and the correlation function of a periodic waveform are a Fourier transform pair. [8+8]
3. (a) Explain the operation of square law modulator.
- (b) The message signal is given by $m(t) = 20\cos 2\pi t$ -volts and the carrier wave is $c(t) = 50 \cos 100\pi t$ volts. Find the power developed across a load of 100-ohms due to the AM wave with 75% modulation. [6+10]
4. (a) Explain working of ratio detector for FM demodulation.
- (b) The equation of an angle-modulated voltage is $v = 10 \sin (10^8 t + 3\sin 10^4 t)$. What form of angle modulation is this? Calculate the carrier and modulating frequencies, the modulation index and deviation, the power dissipated in a 100-ohm resistor. [8+8]
5. (a) What are the various types of noise that effect the digital communication? Explain in detail about each of them and techniques to minimize them.
- (b) A signal has peak-to-peak variation of 8 V and a bandwidth equal to 5KHz. If the signal is converted into PCM. With 32 levels find the bit rate, bandwidth and the quantization noise power. [8+8]
6. (a) What is sampling? Explain the need for sampling and hence discuss various types of sampling.

- (b) Explain clearly the process of sampling for low pass signals and derive conditions for optimum reconstruction of signal. [8+8]
7. (a) The voice frequency-modulating signal of a PCM system is quantized in 16 levels with the following probabilities,
 $P_1 = P_2 = P_3 = P_4 = 0.1$
 $P_5 = P_6 = P_7 = P_8 = 0.05$
 $P_9 = P_{10} = P_{11} = P_{12} = 0.075$
 $P_{13} = P_{14} = P_{15} = P_{16} = 0.025$
Find the information rate taking the band limiting frequency of the modulating signal at 3 KHz.
- (b) Derive the capacity for binary symmetric channel. [8+8]
8. Consider (7,4) cyclic cde.
- (a) Derive the generator matrix and parity check matrix.
- (b) Design an encoder and decoder for the code. [8+8]
