

SCHOOL OF ELECTRONICS ENGINEERING  
VIT Vellore  
Principles of communication Engineering (ECE-2024)

B.Tech  
Slot: C1  
1 October 2019

Time: 1.5 Hr

Continuous Assessment Test - II

Maximum Marks: 50

1. A FM wave is represented by  $S_{FM}(t) = 10 \sin[5 \times 10^8 t + 4 \sin 1250t]$ . Find the following [10 marks]
- Modulation index, carrier and modulating frequencies.
  - Maximum deviations and the power dissipated by this FM wave in a  $5\Omega$  resistor.
2. Find the orthogonal basis functions for the set of signals shown Figure 1. [10 marks]

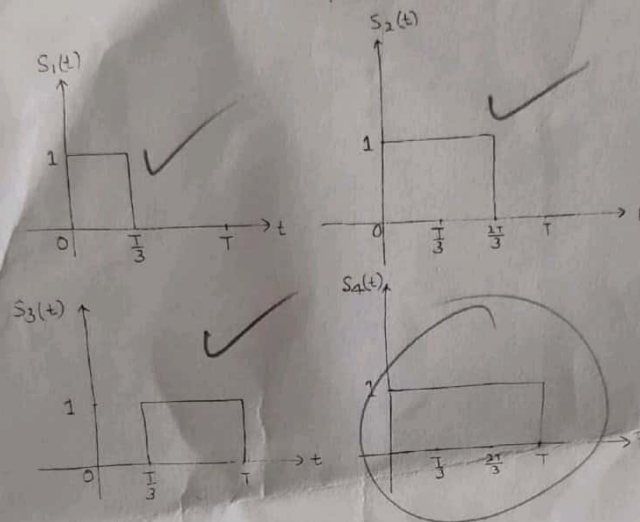


Figure 1:

3. A message signal  $m(t) = 4 \sin(8 \times 10^3 t)$  is transmitted through a channel using 3 bit PCM. If the sampling rate is twice the Nyquist rate. Determine the following— [10 marks]
- Calculate the parameters of PCM
  - If the sampled values are 3.9, 2.5, 0.2, 1.2, 3.8, 3.3 Determine the quantizer output and quantization error for each sample. Sketch the mid-rise characteristics of this uniform quantizer
4. A compact disc (CD) records audio signals digitally using PCM. Assume the audio signal BW is 15 KHz. [10 marks]
- Determine the Nyquist rate. If the Nyquist samples are quantized into  $L = 65536$  levels and then binary coded, determine the number of binary digits required to encode a sample.
  - Determine the number of binary digits/second (bit/s) required to encode the audio signal. For practical reasons, the signal is sampled at a rate well above the Nyquist rate at 44100 samples/second. If  $L = 65536$ , determine number of bits/second required to encode the signal and transmission bandwidth of the encoded signal.
5. A delta modulator (DM) system operates at 3 times Nyquist rate for signal with 3.3 kHz bandwidth. The quantization step is 250 mV. Determine the maximum amplitude of a 1 kHz input sinusoid for which the DM does not show the slope overload. [10 marks]