

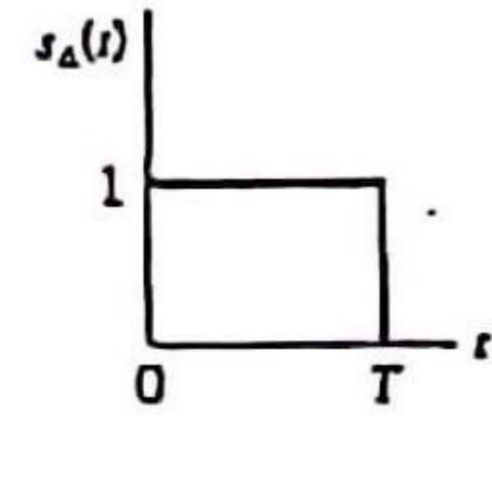
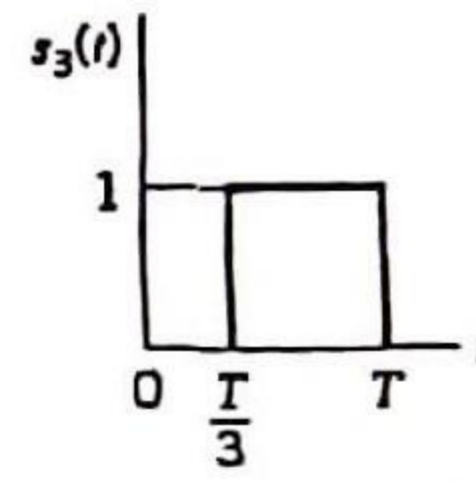
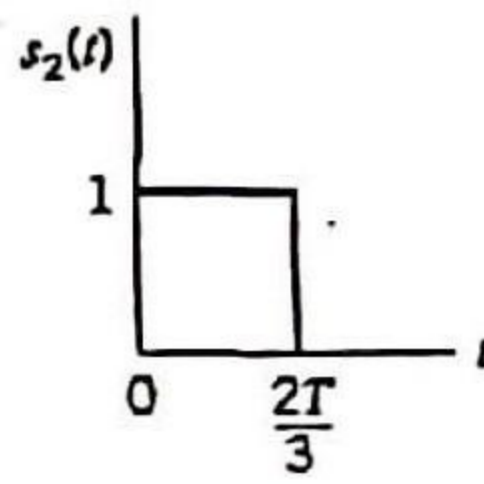
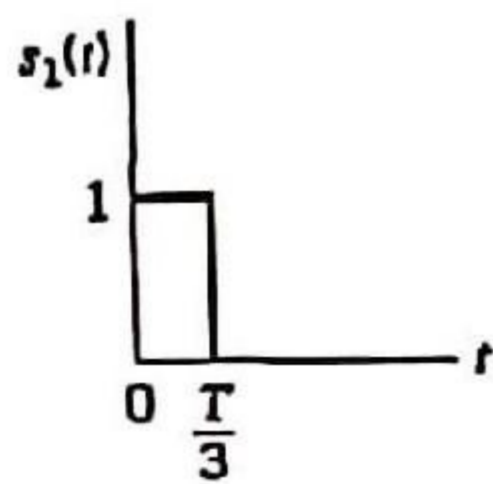
EC-501 ADVANCED COMMUNICATION SYSTEMS

Time: 3:00 Hrs

Max. Marks: 100

Note: Attempt All Questions.
 Assume suitable missing data, if any.

Q1. (a) Describe the Gram Schmidt orthogonalization procedure and find out the constellation diagram or signal space diagram for the following signals: [10]



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(b) Define Autocorrelation function of a wide sense stationary (WSS) random process and mention its properties? [5]

(c) Attempt any one of the following

1) Consider a sinusoidal signal with random phase defined by [5]

$$X(t) = A \cos(2\pi f_c t + \theta)$$

Where A and f_c are constants and θ is a random variable that is uniformly distributed over the interval $[-\pi, \pi]$. Find out mean and autocorrelation of this random process and comment whether it is a WSS process.

2) Define Ergodic processes and find out the expression for ensemble mean of the output $Y(t)$ of an LTI system $h(t)$ with a stationary random process $X(t)$ as its input. [5]

Q2. (a) Define matched filter and find out the expression of the impulse response $h(t)$ of the matched filter for an input signal $s(t)$ of duration 0 to T secs. [10]

(b) Define the following with suitable illustrations: [5]

- 1). Scalar Quantization
- 2). Vector Quantization

(c) Attempt any one of the following

1) Define Rate Distortion theorem. [5]