

1059
B.E. (Electrical and Electronics Engineering)
Sixth Semester
EE-612: Signal and System

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

x-x-x

Q.No.1 (i) Do all the signals belong to either energy signal or power signal category?

- (ii) Distinguish between causal and non-causal signals.
- (iii) What are the conditions for a system to be LTI system?
- (iv) Define convolution integral.
- (v) What do you mean by aliasing?
- (vi) What are the Dirichlet's conditions of Fourier series?
- (vii) What is the effect of Hilbert transform?
- (viii) State the initial and final value theorem of Laplace transform.
- (ix) Define DTFT and inverse DTFT.
- (x) What is ROC in Z-transform?

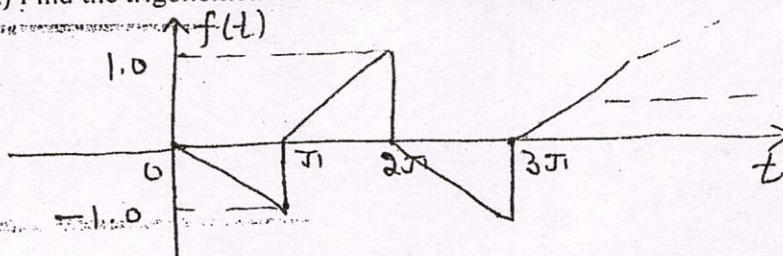
(10x1=10)

Part - A

Q.No.2 (a) Define a signal. How the signals are classified? (6)

(b) Identify the system $h(n)$ if the input $x(n) = \{1, 2, -1\}$ and output $y(n) = \{2, 4, 0, 4, -2\}$ (4)

Q.No.3 (a) Find the trigonometric Fourier series for the periodic function $f(t)$ as shown:



(6)

(b) Determine the discrete Fourier series representation of the signal:

$$x(n) = \cos(\pi/3)n + \sin(\pi/4)n \quad (4)$$

Q.No.4 (a) Explain in detail, reconstruction of signals using interpolation. (5)

(b) Mention any five properties of continuous time Fourier transform. (3)

(c) Find the Fourier transform of $e^{-at} \sin \omega_0 t u(t)$, assume $a > 0$ (2)

Part -B

Q. No. 5 (a) Find the discrete time Fourier transform of $\delta(n)$ and draw its spectrum. (4)

(b) Determine the Fourier coefficients for the periodic sequence $x(n) = \{0, 1, 2, 3\}$ with period $N=4$. (6)

Q.No.6 (a) Find the inverse Laplace transform for the below signals:

(i) $X_1(s) = \frac{s^2 + 6s + 7}{s^2 + 3s + 2}, \text{Re}(s) > -1$

(ii) $X_2(s) = \frac{2s + 1}{s + 2}, \text{Re}(s) > -2$ (4)

(b) Find the initial value and final value of $x(t)$, given:

$X(s) = \frac{5s + 3}{s(s + 1)}, \text{Re}(s) > 0$ (2)

(c) What do you mean by Hilbert transform? Mention the properties of Hilbert transform. (4)

Q.No.7 (a) Find the Z-transforms of the sequences given by:

(i) $x_1(n) = (1/5)^n u(n-1)$ (ii) $x_2(n) = 2u(n) - 3u(n-5)$ (4)

(b) Mention any six properties of DTFT. (4)

(c) State and prove Parseval's relation for discrete time Fourier transform. (2)

x-x-x