

B.E. Fourth Semester (Electronics & Telecommunication) (New)
Signals And Systems : 4 ET 01

P. Pages : 3

Time :

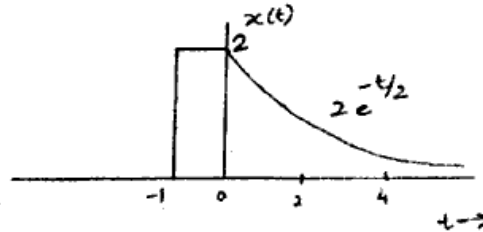


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Max. Marks :

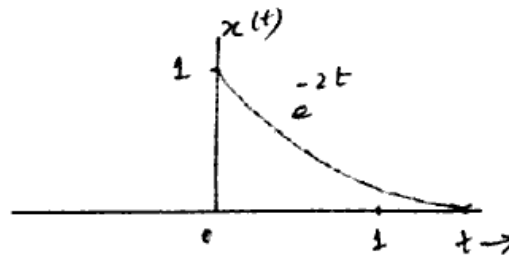
1. a) Explain energy signal and hence obtain the energy of signal shown in figure.

6



- b) An exponential function $x(t) = e^{-2t}$ shown in figure is delayed by 1 second. Sketch and mathematically describe the delayed function. Repeat the problem with $x(t)$ advance by 1 second.

7



OR

2. a) Show that the system described by the equation

6

$$\frac{dy}{dt} + 3y(t) = x(t) \text{ is linear.}$$

- b) Find $y_0(t)$, the zero-input component of response for an LTIC system described by the following differential equation

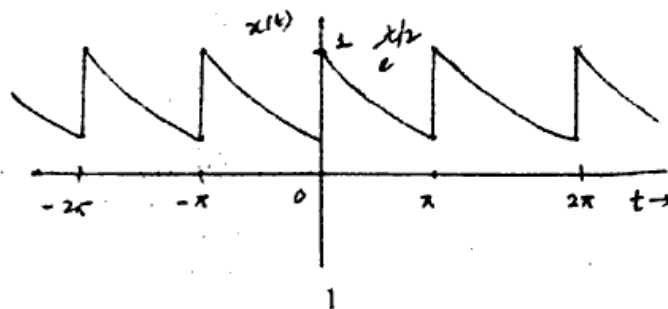
7

$$(D^2 + 3D + 2)y(t) = Dx(t)$$

when the initial condition are $y_0(0) = 0$ and $y_0'(0) = -5$.

3. a) Find the compact trigonometric Fourier series for the periodic signal $x(t)$ shown in figure. Sketch the amplitude and phase spectra.

10



- b) Explain Existence and convergence of the Fourier series. 4

OR

4. a) A periodic signal $x(t)$ is represented by a trigonometric Fourier series
 $x(t) = 2 + 3 \cos 2t + 4 \sin 2t + 2 \sin(3t + 30^\circ) - \cos(7t + 150^\circ)$ 10
 Express this series as a compact-trigonometric Fourier series and sketch amplitude and phase spectra.
- b) Explain Parseval's theorem for Fourier series. 4
5. a) Explain the relation between Fourier transform and Laplace transform. 6
- b) Find the zero state response of a stable LTIC system with frequency response $H(s) = \frac{1}{s+2}$ 7
 and the input is $x(t) = e^{-t}u(t)$.

OR

6. a) Find the Fourier transform of $e^{-a|t-t_0|}$. 4
- b) State and prove the following properties of Fourier transform 9
 i) Linearity
 ii) Convolution
 iii) Time shifting.
7. a) Determine the Laplace transform of the following. 6
 a) $\delta(t)$
 b) $u(t)$
 c) $\cos \omega_0 t u(t)$
- b) Determine the initial and final values of $y(t)$ if its Laplace transform $y(s)$ is given by 7
 $y(s) = \frac{10(2s+3)}{s(s^2+2s+5)}$

OR

8. a) Find canonic direct form realization of following transfer function. 9
 a) $\frac{5}{s+7}$
 b) $\frac{s}{s+7}$
 c) $\frac{s+5}{s+7}$
- b) Explain Parallel and Cascade realization of system. 4

9. a) Draw the signal graphically if 7
 $x(n) = \{1, -1, 1, 1\}$
i) $x(n+2)$
ii) $x(-n)$
iii) $x(-n+2)$
- b) Check whether the given system is time variant or time invariant 7
i) $y(n) = nx(n)$
ii) $y(n) = x(n) + nx(n-1)$

OR

10. a) Solve iteratively 7
 $y(n) - 0.5y(n-1) = x(n)$
with initial condition $y(-1) = 16$ and causal input $x(n) = n^2$ starting at $n = 0$.
- b) Explain finding natural and forced response in classical solution of linear difference equation of discrete time system. 7
11. a) Explain z-transform and existence of z-transform. 6
b) Explain DFT and write any two properties of z-transform. 7

OR

12. a) Explain relation between DTFT and CTFT. 6
b) Explain Discrete time Fourier Series for analysis of signals. 7

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