2124

B.E. (Electronics and Communication Engineering)
Third Semester
EC-302: Signals and Systems

Time allowed: 3 Hours   Max. Marks: 50

NOTE: *Attempt* <u>*five*</u> *questions in all, including Question No. I which is compulsory and selecting two questions from each Section. Use of scientific calculator is allowed.*
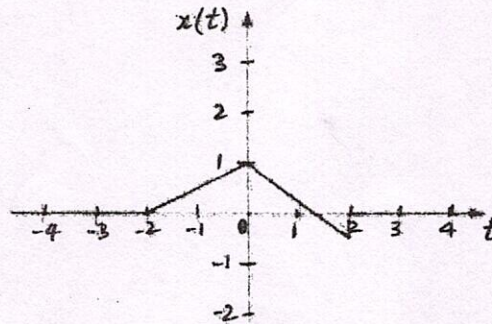
x-x-x

Q.1 Attempt all questions:-
   (a) Define Gibbs Phenomenon.   (2)
   (b) State Time Shifting property in relation to Fourier series.   (2)
   (c) Define continuous time unit step and unit impulse.   (2)
   (d) What is the Aperture effect?   (2)
   (e) What is zero input Response?   (2)

Section- A

Q. 2(a) Sketch the even & odd parts of the following signal shown in figure below.   (5)

(b) Construct the following signals.   (5)
(i) $10\,[u(t-3)-u(t+3)]$ (ii) $3r(t+2)-6r(t+1)+3r(t-1)+3u(t-3)$

Q.3 (a) Derive the necessary expression to represent the function (t) using Trigonometric Fourier Series.   (5)
   (b) Compute the convolution sum of $x[n]=u[n]-u[n-8]$ & $h[n]=u[n]-u[n-5]$.   (5)

Q.4 (a) Find out Fourier transform of

$$x(t) = te^{-at}u(t)$$ (5)

   (b) Determine the Nyquist sampling rate and Nyquist sampling interval for the signals given by (i) $x_1(t) = 2sinc(300\pi t)$ and (ii) $x_2(t) = sinc(70\pi t)sinc(90\pi t)$..   (5)

Section-B

Q.5 (a) What is the relation between impulse response and Transfer function?   (5)

   (b) Calculate inverse laplace Transform for following.   (5)

   (i) $X(s)=log\left(\frac{s+1}{s+2}\right)$ (ii) $X(s)=\frac{s^2+2s+5}{(s+3)(s+5)^2}$ ROC:Re(s) >-3

Q.6 (a) Explain Region of convergence in Z-Transform.   (5)
   (b) Calculate Z-Transform of the $X(n)= n^2\,u(n)$.   (5)

Q.7 (a) Explain State transition matrix and its importance.   (5)
   (b) Discuss the relation between Fourier transform and Laplace Transform.   (5)

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