Set No. 2 **R07** Code No: 07A4EC19 II B.Tech II Semester Examinations, APRIL 2011 SIGNALS AND SYSTEMS Common to Instrumentation And Control Engineering, Electronics And **Computer Engineering** Time: 3 hours Max Marks: 80 Answer any FIVE Questions All Questions carry equal marks \*\*\*\* 1. (a) Determine the Fourier Transform of a trapezoidal function shown in figure 5a. Draw its spectrum. f(t) -m -n m 0 n

Figure 5a

(b) Using Parseval's theorem for power signals, Evaluate  $\int_{-\infty}^{\alpha} e^{-2t} u(t) dt$ . [10+6]

2. (a) Determine an expression for the correlation function of a square wave having the values 1 or 0 and a period T.

(b) The energy of a non periodic wave form  $E = \int_{-\infty}^{\infty} v^2(t) dt$ . i. Show that this can be written as  $E = \int_{-\infty}^{\infty} v(t) dt \int_{-\infty}^{\infty} v(f) e^{j2\pi ft} df$ . ii. Show that by interchanging the order by integration we have

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$$E = \int_{-\infty}^{\infty} v(f) v^*(f) df = \int_{-\infty}^{\infty} |v(f)|^2 df \qquad [8+8]$$

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3. (a) Define: i) Even and odd functions

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(c)

- ii) Periodic and aperiodic signals.
- (b) The following waveform is made up of straight line segments. For this waveform, write an expression for v(t) in terms of steps, ramps and related waveforms shown in figure 3.



4. (a) Determine the Fourier Series of wave form shown in figure 4a up to 5th harmonic. When time of repetition, T = 20m sec.



Figure 4a

- (b) Discuss the method of computing the effective value of the non-sinusoidal periodic wave form. [8+8]
- 5. (a) How we can reconstruct the original signal from sampled signal.
  - (b) What is an apecture effect? Explain why flat top samples get the aperture effect. [8+8]
- 6. (a) Explain Paley Wiener criterion with reference to physical realizability of a system.
  - (b) A periodic signal shown below is transmitted through a system with transfer function  $H(\omega)$  shown in figure 7b. Find the PSD spectrum and power of the output signal for  $T = \frac{2\pi}{3}$ . Also calculate the power of input signal f(t).[6+10]



\*\*\*\*

(c)





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4.

5.

system.

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3. (a) Determine the Fourier Transform of a trapezoidal function shown in figure 5a. Draw its spectrum.



- (b) What is an apecture effect? Explain why flat top samples get the aperture effect. [8+8]
- 6. (a) Find the inverse z transform of X(z) = 1/(1024-z^{-10}), |z| > 0.
  (b) Distinction between Laplace, Fourier and Z transforms. [8+8]
- 7. (a) Explain Paley Wiener criterion with reference to physical realizability of a

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8.

(b) A periodic signal shown below is transmitted through a system with transfer function  $H(\omega)$  shown in figure 7b. Find the PSD spectrum and power of the output signal for  $T = \frac{2\pi}{3}$ . Also calculate the power of input signal f(t).[6+10]



i. 
$$\frac{s^3 + 1}{s(s+1)(s+2)}$$
  
ii.  $\frac{s-1}{(s+1)(s^2+2s+5)}$  [8+8]

\*\*\*\*



- 3. (a) Determine the Fourier Transform of a trapezoidal function shown in figure 5a.
  - Draw its spectrum.

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i. 
$$\frac{s^3 + 1}{s(s+1)(s+2)}$$
  
ii.  $\frac{s-1}{(s+1)(s^2+2s+5)}$  [8+8]

- 5. (a) Determine an expression for the correlation function of a square wave having the values 1 or 0 and a period T.
  - (b) The energy of a non periodic wave form  $E = \int_{-\infty}^{\infty} v^2(t) dt$ .
    - i. Show that this can be written as  $E = \int_{-\infty}^{\infty} v(t) dt \int_{-\infty}^{\infty} v(f) e^{j2\pi ft} df$ .
    - ii. Show that by interchanging the order by integration we have

$$E = \int_{-\infty}^{\infty} v(f) v^*(f) df = \int_{-\infty}^{\infty} |v(f)|^2 df \qquad [8+8]$$

- 6. (a) Explain Paley Wiener criterion with reference to physical realizability of a system.
  - (b) A periodic signal shown below is transmitted through a system with transfer function  $H(\omega)$  shown in figure 7b. Find the PSD spectrum and power of the output signal for  $T = \frac{2\pi}{3}$ . Also calculate the power of input signal f(t).[6+10]



- 7. (a) How we can reconstruct the original signal from sampled signal.
  - (b) What is an apecture effect? Explain why flat top samples get the aperture effect. [8+8]
- 8. (a) Determine the Fourier Series of wave form shown in figure 4a up to 5th harmonic. When time of repetition. T = 20m sec.



Figure 4a

(b) Discuss the method of computing the effective value of the non-sinusoidal periodic wave form. [8+8]

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 Set No. 3

 BL B.Tech II Semester Examinations, APRIL 2011  
SIGNALS AND SYSTEMS

 SIGNALS AND SYSTEMS

 Common to Instrumentation And Control Engineering, Electronics And  
Computer Engineering

 Time: 3 hours

 Max Marks: 80

 Answer any FIVE Questions

 All Questions carry equal marks

 \*\*\*\*\*

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the values 1 or 0 and a period T.

 (b) The energy of a non periodic wave form 
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 (c) (b)  $T = \int_{-\infty}^{\infty} v(f) dt = \int_{-\infty}^{\infty} v(t) dt^2 = v(t) e^{2\pi f t} dt$ 

 (c) Show that by interchanging the order by bucgration we have

  $E = \int_{-\infty}^{\infty} v(f) dt = \int_{-\infty}^{\infty} v(t) dt^2 = v(t) e^{2\pi f t} dt$ 

 (c) (b) What is an apecture effect? Explain why flat top sampled signal.

 (b) Distinction between Laplace,



Figure 4a

(b) Discuss the method of computing the effective value of the non-sinusoidal periodic wave form. [8+8]

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5. (a) Determine the Fourier Transform of a trapezoidal function shown in figure 5a. Draw its spectrum.



- 7. (a) Explain Paley Wiener criterion with reference to physical realizability of a system.
  - (b) A periodic signal shown below is transmitted through a system with transfer function  $H(\omega)$  shown in figure 7b. Find the PSD spectrum and power of the output signal for  $T = \frac{2\pi}{3}$ . Also calculate the power of input signal f(t).[6+10]



Figure 3

(c) Evaluate the integrated  $\int_{-1}^{1} e^{-|t|} dt$ . [4+6+6]

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