

Code No: RR210402

RR

Set No. 2

II B.Tech I Semester Examinations, November 2010

SIGNALS AND SYSTEMS

Common to ICE, ETM, E.CONT.E, EIE, ECE

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Differentiate clearly between the even, odd and half wave symmetry waveforms with respect to their Fourier co-efficients (use appropriate waveform) in their Fourier series representation. [6M]
- (b) Find the trigonometric Fourier series for the periodic wave form shown below the figure7b and draw its magnitude spectrum. [10M]

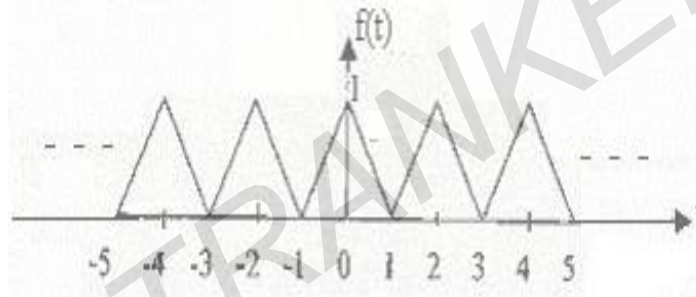


Figure 7b

2. (a) Differentiate clearly the Fourier Transform form and Fourier series and discuss the importance of Fourier Transform in spectral analysis. [6M]
- (b) Using the property of Fourier transforms, find the Fourier transform of the waveform shown in figure4b : [10]

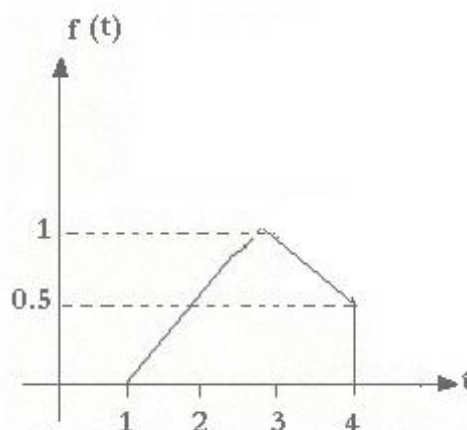


Figure 4b

3. (a) What is an LTI system? Explain its properties. Derive an expression for the transfer function of an LTI system. [2+4+4=10M]
- (b) Obtain the conditions for the distortionless transmission through a system. What do you understand by the term signal bandwidth? [4+2=6M]

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4. (a) Define average power and obtain relationship between average power and power spectral density. [8M]
 (b) Derive the expression for Power Density Spectrum of a periodic signal. [8M]
5. (a) Given $H(z) = \{z+1\}/[3(z^2)-4z+1]$, find $h(n)$ by partial fraction method. R.O.C. $|z| > 1$. [10M]
 (b) Prove the differentiation property of z-transform. [6M]
6. (a) Determine auto correlation function $R_g(\lambda)$ for a function $f(t) = e^{-at} u(t)$. [8M]
 (b) Define auto correlation and cross-correlation of signals and explain their significance. [8M]
7. (a) Find the signal $x(t)$, the Laplace transform of which is $X(s) = \frac{s^3+7s^2+18s+20}{s^2+5s+6}$ [8M]
 (b) State and prove time-scaling and convolution properties of Laplace transform. Also mention their ROC. [4+4=8M]
8. (a) A rectangular function defined by [10M]

$$f(t) = \begin{cases} 1 & 0 < t < \pi \\ -1 & \pi < t < 2\pi \end{cases}$$
 Approximate above rectangular function by a single sinusoid $\sin t$, Evaluate Mean square error in this approximation. Also show what happens when more number of sinusoidal are used for approximations.
 (b) Discuss GIBB'S Phenomena in the above problem. [6M]

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Set No. 4

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Time: 3 hours

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 (b) Obtain the conditions for the distortionless transmission through a system. What do you understand by the term signal bandwidth? [4+2=6M]
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4. (a) Define average power and obtain relationship between average power and power spectral density. [8M]
 (b) Derive the expression for Power Density Spectrum of a periodic signal. [8M]
5. (a) Find the signal $x(t)$, the Laplace transform of which is [8M]

$$X(s) = \frac{s^3 + 7s^2 + 18s + 20}{s^2 + 5s + 6}$$

 (b) State and prove time-scaling and convolution properties of Laplace transform. Also mention their ROC. [4+4=8M]
6. (a) Given $H(z) = \{z+1\}/[3(z^2)-4z+1]$, find $h(n)$ by partial fraction method. R.O.C. $|z| > 1$. [10M]
 (b) Prove the differentiation property of z-transform. [6M]
7. (a) Differentiate clearly between the even, odd and half wave symmetry waveforms with respect to their Fourier co-efficients (use appropriate waveform) in their Fourier series representation. [6M]
 (b) Find the trigonometric Fourier series for the periodic wave form shown below the figure 7b and draw its magnitude spectrum. [10M]

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Set No. 4

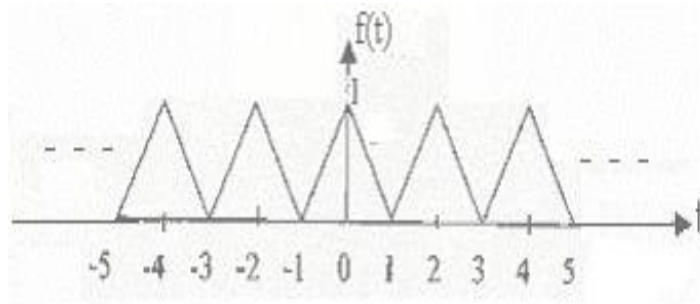


Figure 7b

8. (a) Differentiate clearly the Fourier Transform form and Fourier series and discuss the importance of Fourier Transform in spectral analysis. [6M]
- (b) Using the property of Fourier transforms, find the Fourier transform of the waveform shown in figure 4b : [10]

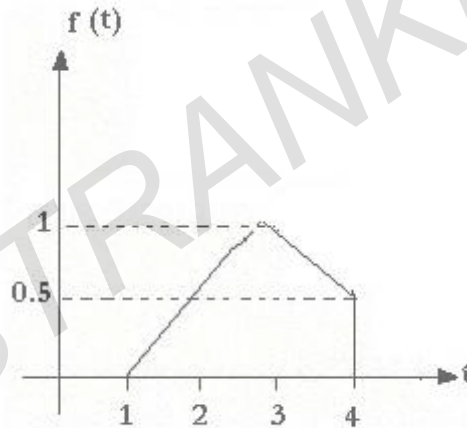


Figure 4b

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Set No. 1

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- Define average power and obtain relationship between average power and power spectral density. [8M]
 - Derive the expression for Power Density Spectrum of a periodic signal. [8M]
- What is an LTI system? Explain its properties. Derive an expression for the transfer function of an LTI system. [2+4+4=10M]
 - Obtain the conditions for the distortionless transmission through a system. What do you understand by the term signal bandwidth? [4+2=6M]
- Determine auto correlation function $R_g(\lambda)$ for a function $f(t) = e^{-at} u(t)$. [8M]
 - Define auto correlation and cross-correlation of signals and explain their significance. [8M]
- Given $H(z) = \{z+1\} / [3(z^2)-4z+1]$, find $h(n)$ by partial fraction method. R.O.C. $|z| > 1$. [10M]
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- Find the signal $x(t)$, the Laplace transform of which is $X(s) = \frac{s^3+7s^2+18s+20}{s^2+5s+6}$ [8M]
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- Differentiate clearly between the even, odd and half wave symmetry waveforms with respect to their Fourier co-efficients (use appropriate waveform) in their Fourier series representation. [6M]
 - Find the trigonometric Fourier series for the periodic wave form shown below the figure 7b and draw its magnitude spectrum. [10M]

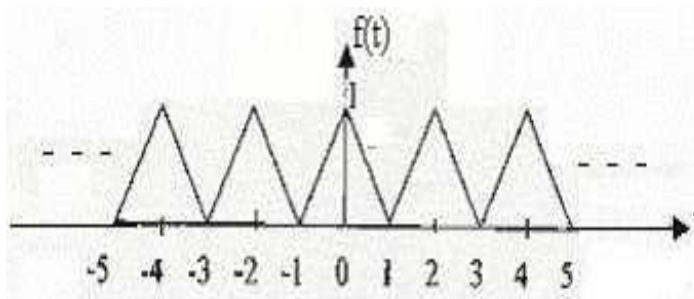


Figure 7b

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Set No. 1

7. (a) Differentiate clearly the Fourier Transform form and Fourier series and discuss the importance of Fourier Transform in spectral analysis. [6M]
- (b) Using the property of Fourier transforms, find the Fourier transform of the waveform shown in figure 4b : [10]

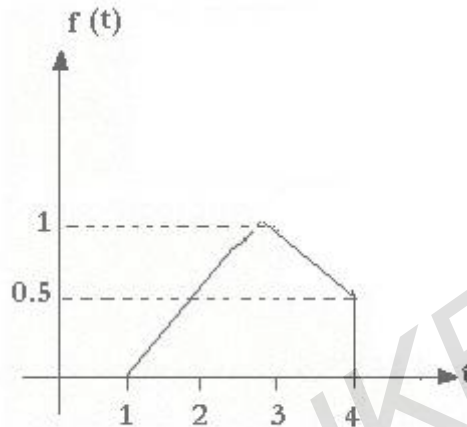


Figure 4b

8. (a) A rectangular function defined by [10M]
- $$f(t) = \begin{cases} 1 & 0 < t < \pi \\ -1 & \pi < t < 2\pi \end{cases}$$
- Approximate above rectangular function by a single sinusoid $\sin t$, Evaluate Mean square error in this approximation. Also show what happens when more number of sinusoidal are used for approximations.
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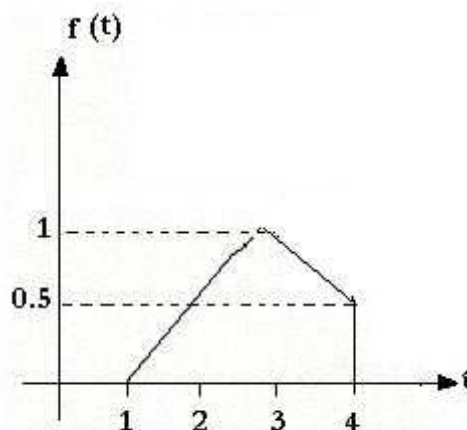


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6. (a) Define average power and obtain relationship between average power and power spectral density. [8M]
 (b) Derive the expression for Power Density Spectrum of a periodic signal. [8M]
7. (a) Differentiate clearly between the even, odd and half wave symmetry waveforms with respect to their Fourier co-efficients (use appropriate waveform) in their Fourier series representation. [6M]
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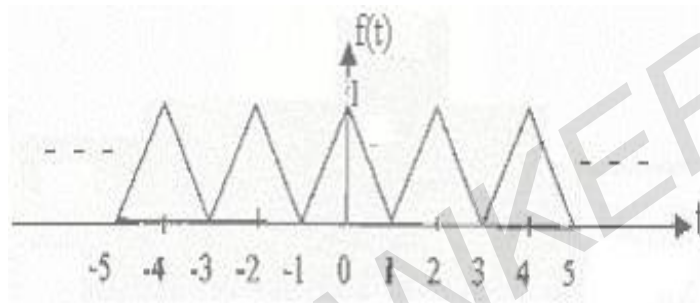


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