

Code No: R05210403

R05**Set No. 2**

II B.Tech I Semester Examinations, November 2010

SIGNALS AND SYSTEMS

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

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Find the power of periodic signal $g(t)$ shown in figure 5c. Find also the powers of [16]

- (a) $-g(t)$
(b) $2g(t)$
(c) $g(t)$.

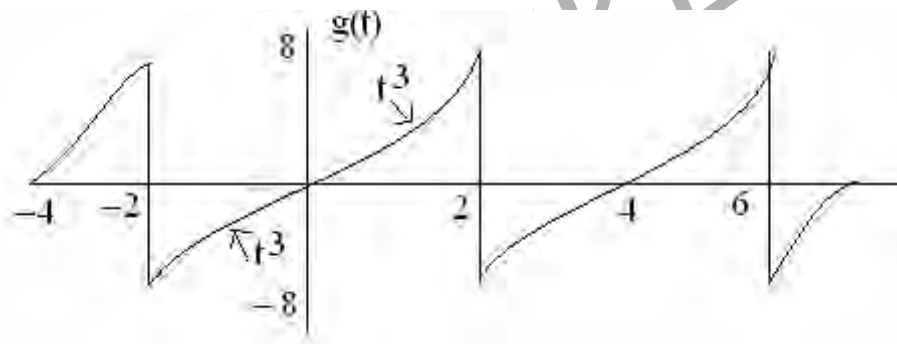


Figure 5c

2. (a) Write short notes on "Complex Fourier Spectrum".
(b) Find the Exponential Fourier series for the rectified Sine wave as shown in figure 6. [6+10]

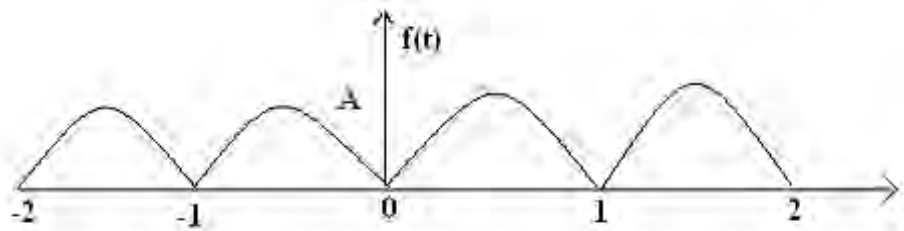


Figure 6

3. (a) With the help of graphical example explain sampling theorem for Band limited signals.
(b) Explain briefly Band pass sampling. [8+8]
4. (a) Explain the difference between the following systems.
i. Time invariant and time invariant systems.

Code No: R05210403

R05**Set No. 2**

- ii. Causal and non-causal systems.
- (b) Consider a stable LTI system characterized by the differential equation $\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = \frac{dx(t)}{dt} + 2x(t)$. Find its impulse response and transfer function. [8+8]
5. (a) Using the Power Series expansion technique, find the inverse Z-transform of the following $X(Z)$:
- $X(Z) = \frac{Z}{2Z^2 - 3Z + 1} \quad |Z| < \frac{1}{2}$
 - $X(Z) = \frac{Z}{2Z^2 - 3Z + 1} \quad |Z| > 1$
- (b) Find the inverse Z-transform of $X(Z) = \frac{Z}{Z(Z-1)(Z-2)^2} \quad |Z| > 2$ [8+8]
6. (a) When a function $f(t)$ is said to be laplace transformable.
 (b) What do you mean by region of convergence.
 (c) List the advantages of Laplace transform.
 (d) If $\delta(t)$ is a unit impulse function find the laplace transform of $\frac{d^2}{dt^2} [\delta(t)]$. [4+4+4+4]
7. (a) Test the following functions for periodicity
- $x(t) = e^{Sint}$
 - $x(t) = t e^{Sint}$
- (b) Prove that $\int_{-\alpha}^{\alpha} x(t) \delta(at) dt = \frac{1}{|a|} x(o)$ [6+10]
8. (a) Determine the Fourier transform of a two sided exponential pulse $x(t) = e^{-|t|}$
 (b) Find the Fourier transforms of an even function $x_e(t)$ and odd function $x_o(t)$ of $x(t)$. [8+8]

Code No: R05210403

R05**Set No. 4**

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SIGNALS AND SYSTEMS

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

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Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

- Explain the difference between the following systems.
 - Time invariant and time invariant systems.
 - Causal and non-causal systems.
 - Consider a stable LTI system characterized by the differential equation $\frac{d^2 y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = \frac{dx(t)}{dt} + 2x(t)$. Find its impulse response and transfer function. [8+8]
- Find the power of periodic signal $g(t)$ shown in figure 5c. Find also the powers of
 - $-g(t)$
 - $2g(t)$
 - $g(t)$.

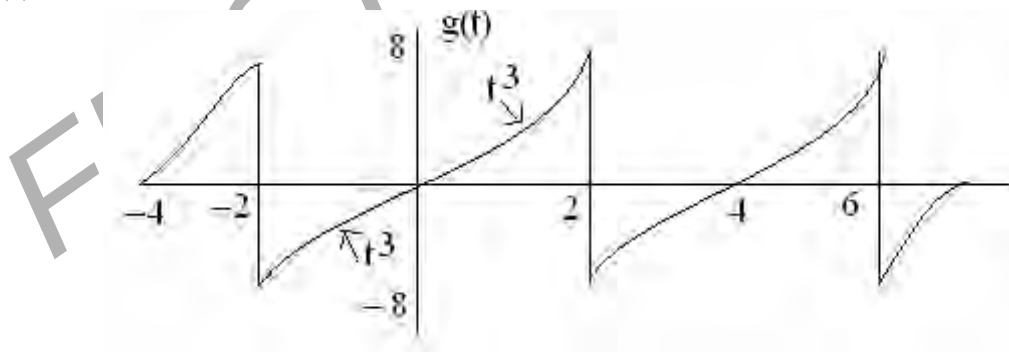


Figure 5c

- Using the Power Series expansion technique, find the inverse Z-transform of the following $X(Z)$:
 - $X(Z) = \frac{Z}{2Z^2 - 3Z + 1} \quad |Z| < \frac{1}{2}$
 - $X(Z) = \frac{Z}{2Z^2 - 3Z + 1} \quad |Z| > 1$
 - Find the inverse Z-transform of $X(Z) = \frac{Z}{Z(Z-1)(Z-2)^2} \quad |Z| > 2$ [8+8]
- Determine the Fourier transform of a two sided exponential pulse $x(t) = e^{-|t|}$
 - Find the Fourier transforms of an even function $x_e(t)$ and odd function $x_o(t)$ of $x(t)$. [8+8]
- When a function $f(t)$ is said to be laplace transformable.

Code No: R05210403

R05**Set No. 4**

- (b) What do you mean by region of convergence.
- (c) List the advantages of Laplace transform.
- (d) If $\delta(t)$ is a unit impulse function find the laplace transform of $\frac{d^2}{dt^2} [\delta(t)]$.
[4+4+4+4]
6. (a) With the help of graphical example explain sampling theorem for Band limited signals.
- (b) Explain briefly Band pass sampling. [8+8]
7. (a) Write short notes on “Complex Fourier Spectrum”.
- (b) Find the Exponential Fourier series for the rectified Sine wave as shown in figure 6. [6+10]

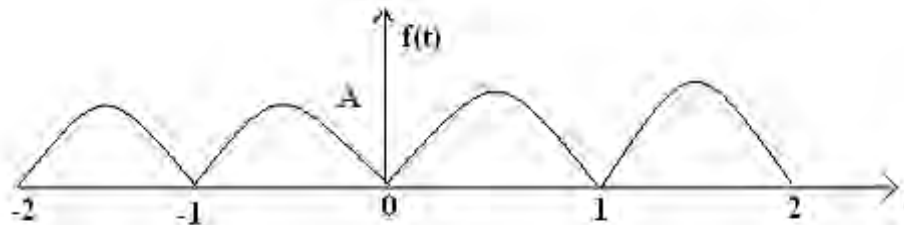


Figure 6

8. (a) Test the following functions for periodicity

i. $x(t) = e^{Sint}$

ii. $x(t) = t e^{Sint}$

- (b) Prove that

$$\int_{-\alpha}^{\alpha} x(t) \delta(at) dt = \frac{1}{|a|} x(0)$$

[6+10]

Code No: R05210403

R05**Set No. 1**

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 - i. $x(t) = e^{Sint}$
 - ii. $x(t) = t e^{Sint}$
- (b) Prove that

$$\int_{-\alpha}^{\alpha} x(t)\delta(at)dt = \frac{1}{|a|}x(o) \quad [6+10]$$
2. (a) With the help of graphical example explain sampling theorem for Band limited signals.
- (b) Explain briefly Band pass sampling. [8+8]
3. (a) Explain the difference between the following systems.
 - i. Time invariant and time invariant systems.
 - ii. Causal and non-causal systems.
- (b) Consider a stable LTI system characterized by the differential equation $\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = \frac{dx(t)}{dt} + 2x(t)$. Find its impulse response and transfer function. [8+8]
4. (a) Using the Power Series expansion technique, find the inverse Z-transform of the following $X(Z)$:
 - i. $X(Z) = \frac{Z}{2Z^2-3Z+1} \quad |Z| < \frac{1}{2}$
 - ii. $X(Z) = \frac{Z}{2Z^2-3Z+1} \quad |Z| > 1$
- (b) Find the inverse Z-transform of $X(Z) = \frac{Z}{Z(Z-1)(Z-2)^2} \quad |Z| > 2$ [8+8]
5. (a) Write short notes on "Complex Fourier Spectrum".
- (b) Find the Exponential Fourier series for the rectified Sine wave as shown in figure 6. [6+10]

Code No: R05210403

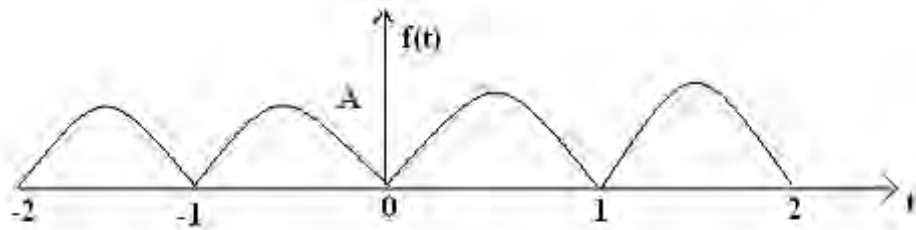
R05**Set No. 1**

Figure 6

6. Find the power of periodic signal $g(t)$ shown in figure 5c. Find also the powers of [16]

- (a) $-g(t)$
- (b) $2g(t)$
- (c) $g(t)$.

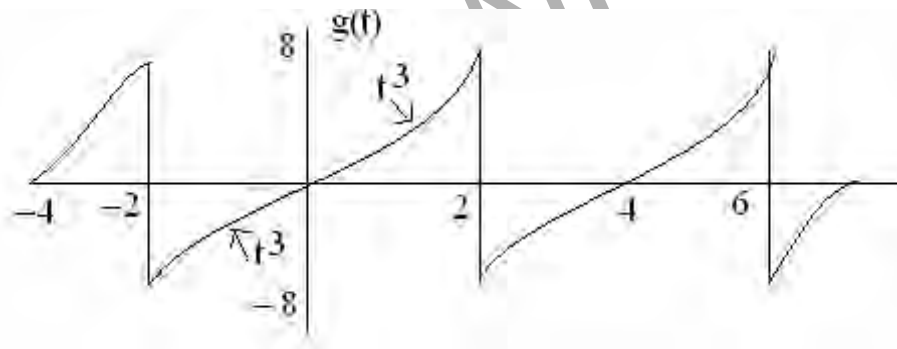


Figure 5c

7. (a) When a function $f(t)$ is said to be laplace transformable.
 (b) What do you mean by region of convergence.
 (c) List the advantages of Laplace transform.
 (d) If $\delta(t)$ is a unit impulse function find the laplace transform of $\frac{d^2}{dt^2} [\delta(t)]$. [4+4+4+4]
8. (a) Determine the Fourier transform of a two sided exponential pulse $x(t) = e^{-|t|}$
 (b) Find the Fourier transforms of an even function $x_e(t)$ and odd function $x_o(t)$ of $x(t)$. [8+8]

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R05**Set No. 3**

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$$\int_{-\alpha}^{\alpha} x(t)\delta(at)dt = \frac{1}{|a|}x(o) \quad [6+10]$$
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[8+8]
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Code No: R05210403

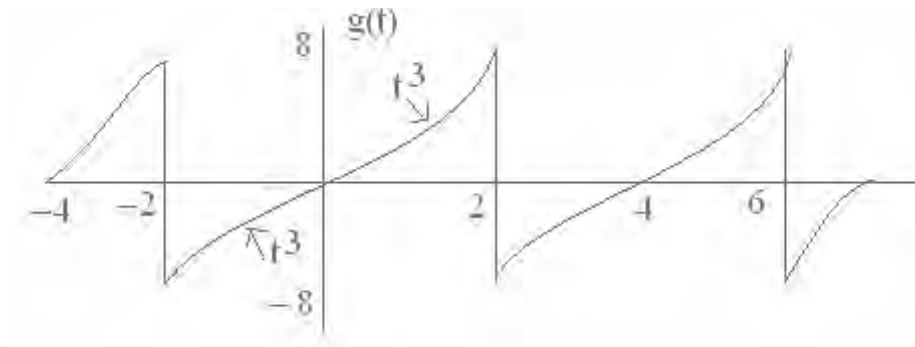
R05**Set No. 3**

Figure 5c

6. (a) Write short notes on “Complex Fourier Spectrum”.
 (b) Find the Exponential Fourier series for the rectified Sine wave as shown in figure 6. [6+10]

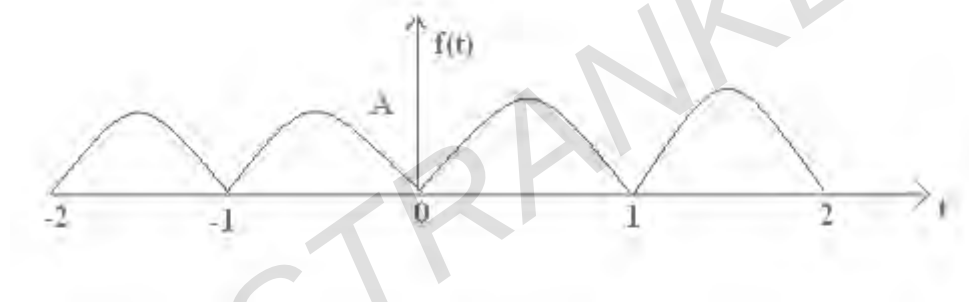


Figure 6

7. (a) Determine the Fourier transform of a two sided exponential pulse $x(t) = e^{-|t|}$
 (b) Find the Fourier transforms of an even function $x_e(t)$ and odd function $x_o(t)$ of $x(t)$. [8+8]
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