Unit 4 - Week 1-Basic tools for communication, Fourier Series/Transform, Properties, Parsevals Relation, Properties of Fourier Transform, LTI Systems

Assignment-1

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-12, 23:59 IST.

1) The energy of a possibly complex signal $x(t)$ is defined as *1 point*

- $\int_{-\infty}^{\infty} x^2(t)dt$
- $\frac{1}{T}\int_{-T}^{T} |x(t)|^2 dt$
- $\lim_{T\to\infty} \frac{1}{T}\int_{-T}^{T} |x(t)|^2 dt$
- $\int_{-\infty}^{\infty} |x(t)|^2 dt$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\int_{-\infty}^{\infty} |x(t)|^2 dt$

2) The power of a possibly complex signal $x(t)$ is defined as *1 point*

- $\int_{-\infty}^{\infty} x^2(t)dt$
- $\frac{1}{T}\int_{-T}^{T} x^2(t) dt$
- $\lim_{T\to\infty} \frac{1}{T}\int_{-T/2}^{T/2} |x(t)|^2 dt$
- $\int_{-\infty}^{\infty} |x(t)|^2 dt$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\lim_{T\to\infty} \frac{1}{T}\int_{-T/2}^{T/2} |x(t)|^2 dt$

3) Consider the Fourier series of a signal $x(t)$ with fundamental frequency $f_0 = \frac{1}{T}$. The coefficient c_l in the Fourier series corresponding to the term $e^{j2\pi l f_0 t}$ is given as *1 point*

- $\frac{1}{T}\int_{-T/2}^{T/2} x(t)e^{j2\pi l f_0 t} dt$
- $T\int_{-T/2}^{T/2} x(t)e^{-j2\pi l f_0 t} dt$
- $\frac{1}{T}\int_{-T/2}^{T/2} x(t)e^{-j2\pi l f_0 t} dt$
- $\int_{-T/2}^{T/2} x(t)e^{j2\pi l f_0 t} dt$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{1}{T}\int_{-T/2}^{T/2} x(t)e^{-j2\pi l f_0 t} dt$

4) Power of the signal $\sum_{k=0}^{\infty} c_k \sin(2\pi k f_0 t)$ with $T = \frac{1}{f_0}$ is *1 point*

- $\frac{1}{2T}\sum_{k=0}^{\infty} c_k^2$
- $\frac{1}{2}\sum_{k=1}^{\infty} c_k^2$
- $\frac{1}{T}\sum_{k=0}^{\infty} c_k^2$
- $\frac{1}{T}c_0^2 + \frac{1}{2T}\sum_{k=1}^{\infty} c_k^2$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{1}{2}\sum_{k=1}^{\infty} c_k^2$

5) Consider the complex signal $\frac{1}{a+jt}, \ -\infty < t < \infty$. Its energy is *1 point*

- $\frac{\pi}{a}$
- $\frac{1}{2a}$
- $\frac{a}{2\pi}$
- $\sqrt{\frac{a}{\pi}}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{\pi}{a}$

6) If $X(f)$ is the Fourier transform of $x(t)$, the Fourier transform of the signal $X(t)$ is *1 point*

- $x(f)$
- $x^*(-f)$
- $x(-f)$
- $x^*(f)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$x(-f)$

7) Fourier transform is best suited for the analysis of *1 point*

- Continuous time aperiodic signals
- Discrete time periodic signals
- Continuous time periodic signals
- Discrete time aperiodic signals

No, the answer is incorrect.
Score: 0
Accepted Answers:
Continuous time aperiodic signals

8) Fourier transform of the signal $\text{sinc}(2t)$ is *1 point*

- 1 for $|f| \le 1$ and 0 otherwise
- $\frac{1}{2}$ for $|f| \le 2$ and 0 otherwise
- $\frac{1}{2}$ for $|f| \le 1$ and 0 otherwise
- 1 for $|f| \le \frac{1}{2}$ and 0 otherwise

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{1}{2}$ for $|f| \le 1$ *and* 0 *otherwise*

9) Let $x(t)$ have the Fourier transform $X(f)$. The Fourier transform of the signal $t^2 x(t)$ is *1 point*

- $\frac{j}{2\pi}\frac{d}{df}X(f)$
- $j2\pi f X(f)$
- $\frac{d^2}{df^2}X(f)$
- $-\frac{1}{4\pi^2}\frac{d^2}{df^2}X(f)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$-\frac{1}{4\pi^2}\frac{d^2}{df^2}X(f)$

10) Let $X(f) = \frac{1}{\pi f}$. Let $x(t)$ denote the inverse Fourier transform of $X(f)$. Then $x(t)$ equals *1 point*

- $\text{sgn}(t)$
- $j\,\text{sgn}(t)$
- $\text{sgn}(t) + \frac{1}{2}\delta(t)$
- $\delta(t)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$j\,\text{sgn}(t)$