Name :

Branch:

1

Consider a signal defined by

$$x(t) = \begin{cases} e^{j10t} & for\ |t| \le 1 \\ 0 & for\ |t| > 1 \end{cases}$$

Its Fourier Transform is

1. $\dfrac{2\sin(\omega-10)}{\omega-10}$ ✓

2. $\dfrac{2e^{j10}\sin(\omega-10)}{\omega-10}$

3. $\dfrac{2\sin\omega}{\omega-10}$

4. $\dfrac{e^{j10}\cdot 2\sin\omega}{\omega}$

2.

A periodic function f(t), with a period of 2π is represented as its Fourier series,

$$f(t) = a_0 + \sum_{n-1}^{\infty} a_n \cos nt + \sum_{n-1}^{\infty} b_n \sin nt$$

If

$$f(t) = \begin{cases} A\sin t, & 0 \le t \le \pi \\ 0, & \pi < t < 2\pi \end{cases}$$

the Fourier series coefficients a_1 and b_1 of f(t) are

1. $a_1 = \dfrac{A}{\pi}; b_1 = 0$

2. $a_1 = \dfrac{A}{2}; b_1 = 0$

3. $a_1 = 0; b_1 = A/\pi$

4. $a_1 = 0; b_1 = \dfrac{A}{2}$ ✓

3. The Fourier transform $X(\omega)$ of $x(t) = e^{-t^2}$ is

Note: $\int_{-\infty}^{\infty} e^{-y^2}dy = \sqrt{\pi}$

1. $\sqrt{\pi}e^{\frac{k^2}{2}}$

2. $\dfrac{e^{-\frac{k^2}{4}}}{2\sqrt{\pi}}$

3. $\sqrt{\pi}e^{-\frac{k^2}{4}}$ ✓

4. $\sqrt{\pi}e^{-\frac{k^2}{2}}$

4. The Fourier transform of a continuous-time signal x(t) is given by $X(\omega) = \dfrac{1}{(10+j\omega)^2}$, $-\infty < \omega < \infty$, where $j = \sqrt{-1}$ and ω denotes frequency. Then the value of $|\ln x(t)|$ at t = 1 is _____ (up to 1 decimal place). (ln denotes the logarithm to base e) **10**

5. The exponential Fourier series coefficient C_0 of x(t) = $\sin^2 t$ is:

1. 0

2. 1/2 ✓

3. -1

4. 2

6. Which of the following statements regarding the Fourier series are correct?

A. For an even symmetry, only sine terms exist.

B. For an even symmetry, only cosine terms exist.

C. For an odd symmetry, only cosine terms exist.

D. For an odd symmetry, only sine terms exist.

Choose the correct answer from the options given below:

1. A and C only

2. B and D only

3. C and D only

4. A and D only

7. Any periodic function $f(x)$ with a period of 2L can be written as

$$f(x) = k + \sum_{i=1}^{\infty} \left(a_i \cos\left(\frac{i\pi}{L}x\right) + b_i \sin\left(\frac{i\pi}{L}x\right) \right).$$

Given that $f(x)$ is an even function. Which of the following option is correct?

1. $k \neq 0, a_i \neq 0, b_i \neq 0$

2. $k = 0$

3. $a_i = 0$

4. $b_i = 0$

8. The Fourier series coefficient of signal $x(t)$ is C_K, then what will be Fourier series coefficient of the signal, $x(0.5t) + x(t - 0.5) + x(-2t)$?

1. $C_K(1 + e^{-jw0.5k}) + C_{-K}$

2. $C_K(2 + e^{-jw0.5k}) + 0.5 C_{-K}$

3. $C_K(1 + e^{-jw0.5k}) + C_K$

4. $C_K(2 + e^{-jw0.5k}) + 0.5 C_K$