

QUIZ – ANSWER KEY

QUIZ NO: 93

TOPIC: ELECTRICAL ENGINEERING

DATE: 26/07/2022

1. Which of the following is done to convert a continuous-time signal into a discrete-time signal?

- [A] Modulating
- [B] Sampling
- [C] Differentiating
- [D] Integrating

Answer: B

Explanation:-

A discrete-time signal can be obtained from a continuous-time signal by replacing t with nT , where T is the reciprocal of the sampling rate or time interval between the adjacent values. This procedure is known as sampling.

2. The even part of a signal $x(t)$ is?

- [A] $x(t)+x(-t)$
- [B] $x(t)-x(-t)$
- [C] $(1/2)*(x(t)+x(-t))$
- [D] $(1/2)*(x(t)-x(-t))$

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Answer: C

Explanation:-

- Let,
- $x(t) = x_e(t) + x_o(t)$
 $\Rightarrow x(-t) = x_e(-t) - x_o(-t)$

By adding the above two equations, we get
 $x_e(t) = (1/2) * (x(t) + x(-t))$.

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3. For a continuous time signal $x(t)$ to be periodic with a period T , then $x(t+mT)$ should be equal to _____

- [A] $x(-t)$
- [B] $x(mT)$
- [C] $x(mt)$
- [D] $x(t)$

Answer: D

Explanation:-

If a signal $x(t)$ is said to be periodic with period T , then $x(t+mT)=x(t)$ for all t and any integer m .

4. Let $x_1(t)$ and $x_2(t)$ be periodic signals with fundamental periods T_1 and T_2 respectively. Which of the following must be a rational number for $x(t)=x_1(t)+x_2(t)$ to be periodic?

- [A] T_1+T_2
- [B] T_1-T_2
- [C] T_1/T_2
- [D] T_1*T_2

Answer: C

Explanation:-

- Let T be the period of the signal $x(t)$
 $\Rightarrow x(t+T)=x_1(t+mT_1)+x_2(t+nT_2)$
Thus, we must have
 $mT_1=nT_2=T$
 $\Rightarrow (T_1/T_2)=(k/m)=$ a rational number.

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5. Let $x_1(t)$ and $x_2(t)$ be periodic signals with fundamental periods T_1 and T_2 respectively. Then the fundamental period of $x(t)=x_1(t)+x_2(t)$ is?

- [A] LCM of T_1 and T_2
- [B] HCF of T_1 and T_2
- [C] Product of T_1 and T_2
- [D] Ratio of T_1 to T_2

Answer: A

Explanation:-

For the sum of $x_1(t)$ and $x_2(t)$ to be periodic the ratio of their periods should be a rational number, then the fundamental period is the LCM of T_1 and T_2 .

6. All energy signals will have an average power of _____?

- [A] Infinite
- [B] Zero
- [C] Positive
- [D] Cannot be calculated

Answer: B

Explanation:-

For any energy signal, the average power should be equal to 0 i.e., $P=0$.

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7. $x(t)$ or $x(n)$ is defined to be an energy signal, if and only if the total energy content of the signal is a _____?
- [A] Finite quantity
 - [B] Infinite
 - [C] Zero
 - [D] None of the mentioned

Answer: A

Explanation:-

The energy signal should have a total energy value that lies between 0 and infinity.

8. If 'F' is the frequency of the analog signal, then what is the minimum sampling rate required to avoid aliasing?
- [A] F
 - [B] 2F
 - [C] 3F
 - [D] 4F

Answer: A

Explanation:-

According to the Nyquist rate, to avoid aliasing the sampling frequency should be equal to twice the analog frequency.

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9. What is the Nyquist rate of the signal $x(t)=3\cos(50\pi t)+10\sin(300\pi t)-\cos(100\pi t)$?
- [A] 50Hz
 - [B] 100Hz
 - [C] 200Hz
 - [D] 300Hz

Answer: D

Explanation:-

The frequencies present in the given signal are $F_1=25\text{Hz}$, $F_2=150\text{Hz}$, $F_3=50\text{Hz}$
Thus $F_{\max}=150\text{Hz}$ and from the sampling theorem,
Nyquist rate= $2 \cdot F_{\max}$
Therefore, $F_s=2 \cdot 150=300\text{Hz}$

10. The relation between analog frequency 'F' and digital frequency 'f' is?

- [A] $F=f \cdot T$ (where T is sampling period)
- [B] $f=F \cdot T$
- [C] No relation
- [D] None of the mentioned

Answer: B

Explanation:-

Consider an analog signal of frequency 'F', which when sampled periodically at a rate of $F_s=1/T$ samples per second yields a frequency of $f=F/F_s \Rightarrow f=F \cdot T$

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