

UNIT-I

MULTIPLE CHOICE QUESTIONS (MCQ)

1. A signal is said to be orthogonal to another signal if their

- A) Sum is zero
- B) Difference is zero
- C) Inner product is zero
- D) Product is one

Answer: C

2. The analogy between vectors and signals is mainly used for

- A) Signal amplification
- B) Signal approximation
- C) Signal modulation
- D) Signal sampling

Answer: B

3. Mean Square Error (MSE) is always

- A) Negative
- B) Positive or Zero
- C) Infinite
- D) Complex

Answer: B

4. A complete set of orthogonal functions is used to

- A) Compress signals
- B) Represent any signal in the space
- C) Increase bandwidth
- D) Remove noise

Answer: B

5. Orthogonality of complex functions is verified using

- A) Ordinary multiplication
- B) Complex conjugate multiplication
- C) Division
- D) Differentiation

Answer: B

6. Which of the following is an energy signal?

- A) Periodic sinusoid
- B) Finite duration pulse

- C) Constant signal
- D) Ramp signal

Answer: B

7. A periodic signal has

- A) Infinite energy
- B) Finite energy
- C) Zero power
- D) Zero frequency

Answer: A

8. A signal satisfying $x(t)=x(-t)$ is

- A) Odd
- B) Even
- C) Periodic
- D) Random

Answer: B

9. Which system satisfies the principle of superposition?

- A) Linear system
- B) Time-varying system
- C) Dynamic system
- D) Nonlinear system

Answer: A

10. The signal e^{at} is called

- A) Sinusoidal signal
- B) Ramp signal
- C) Exponential signal
- D) Impulse signal

Answer: C

11. The amplitude of a sinusoidal signal is represented by

- A) ω
- B) ϕ
- C) A
- D) T

Answer: C

12. The unit impulse function has

- A) Zero area
- B) Unit area

- C) Infinite area
- D) Negative area

Answer: B

13. The derivative of the unit step function is

- A) Ramp
- B) Impulse
- C) Parabolic
- D) Signum

Answer: B

14. The integral of the impulse function is

- A) Ramp
- B) Step
- C) Signum
- D) Parabolic

Answer: B

15. The Signum function has values

- A) 0 and 1
- B) ± 1
- C) 0 and ∞
- D) $\pm\infty$

Answer: B

16. Which of the following is a deterministic signal?

- A) Thermal noise
- B) Speech noise
- C) Cosine wave
- D) Random process

Answer: C

17. The period of a continuous sinusoidal signal is

- A) $\omega/2\pi$
- B) $2\pi/\omega$
- C) π/ω
- D) $1/\omega$

Answer: B

18. The impulse function is also called

- A) Step function
- B) Dirac delta function

- C) Signum function
- D) Ramp function

Answer: B

19. The approximation error becomes minimum when

- A) Mean square error is minimum
- B) Energy is zero
- C) Power is maximum
- D) Frequency is zero

Answer: A

20. Orthogonal functions are mainly used for

- A) Signal decomposition
- B) Signal amplification
- C) Signal modulation
- D) Signal transmission

Answer: A

FILL IN THE BLANKS (FIB)

1. The inner product of two orthogonal signals is **zero**.
2. Mean Square Error is abbreviated as **MSE**.
3. A complete set of orthogonal functions can represent **any** signal in the space.
4. Orthogonality in complex functions involves the **complex conjugate**.
5. Signals are broadly classified as **continuous-time** and **discrete-time** signals.
6. A signal having finite energy is called an **energy** signal.
7. A periodic signal has **infinite** energy.
8. A signal satisfying $x(t)=x(-t)$ is an **even** signal.
9. A system obeying superposition is called a **linear** system.
10. The expression Ae^{at} represents an **exponential** signal.
11. The derivative of the unit step function is the **impulse** function.
12. The integral of the impulse function is the **unit step** function.
13. The area under the unit impulse function is **one (unity)**.

14. The Signum function takes values **+1** and **-1**.
15. The period of a sinusoidal signal is **$2\pi/\omega$** .
16. The amplitude of a sinusoidal signal is denoted by **A**.
17. The angular frequency is represented by **ω** .
18. A deterministic signal can be **completely predicted**.
19. The impulse function is also known as the **Dirac delta** function.
20. Orthogonal signal analysis is analogous to **vector** analysis.