Signal System

50 Most Important

MCQs

with Solution

SIGNAL SYSTEM 50 MOST IMPORTANT MCQ WITH SOLUTION

- **(1)** Unilateral Laplace Transform is applicable for the determination of linear constant coefficient differential equations with _____

- 1) Zero initial condition
- 2) Non-zero initial condition
- 3) Zero final condition
- 4) Non-zero final condition
- 5) None of these

Answer : 2) Non-zero initial condition
Solution : Unilateral Laplace Transform is applicable for the determination of linear constant coefficient differential equations with Non-zero initial condition

- **(2)** Two rectangular waveforms of duration t_1 and t_2 seconds are convolved. What is the shape of the resulting waveform?

- 1) Triangular
- 2) Trapezoidal
- 3) Rectangular
- 4) Semi-circular
- 5) circular

Answer : 2) Trapezoidal
Solution : If two rectangular waveforms of duration t_1 and t_2 seconds are convolved. then the shape of the resulting waveform is Trapezoidal.

- **(3)** What is the nature of Fourier representation of a discrete & aperiodic signal?

- 1) Continuous & periodic
- 2) Discrete and aperiodic
- 3) Continuous & aperiodic
- 4) Discrete & periodic
- 5) None of these

Answer : 1) Continuous & periodic
Solution : Fourier representation of a discrete & aperiodic signal is Continuous & periodic.

- **(4)** Which property of periodic signal in DTFS gets completely clarified / identified by the equation $x (n - n_0)$?

- 1) Conjugation
- 2) Time Reversal
- 3) Frequency Shifting
- 4) Time Shifting
- 5) None of these

Answer : 4) Time Shifting
Solution : Time Shifting property of periodic signal in DTFS gets completely clarified by the equation x (n - n_0).

- **(5)** Duality Theorem / Property of Fourier Transform states that _____

- 1) Shape of signal in time domain & shape of spectrum can be interchangeable
- 2) Shape of signal in frequency domain & shape of spectrum can be interchangeable
- 3) Shape of signal in time domain & shape of spectrum can never be interchangeable
- 4) Shape of signal in time domain & shape of spectrum can never be interchangeable
- 5) None of these

Answer : 1) Shape of signal in time domain & shape of spectrum can be interchangeable
Solution : Duality Theorem / Property of Fourier Transform states that Shape of signal in time domain & shape of spectrum can be interchangeable.

- **(6)** Which property of fourier transform gives rise to an additional phase shift of -2π ftd for the generated time delay in the communication system without affecting an amplitude spectrum ?

- 1) Time Scaling
- 2) Linearity
- 3) Time Shifting
- 4) Duality
- 5) None of these

Answer : 3) Time Shifting
Solution : Time Shifting property of fourier transform gives rise to an additional phase shift of -2π ftd for the generated time delay in the communication system without affecting an amplitude spectrum

- **(7)** Which among the following operations is/are not involved /associated with the computation process of linear convolution?

- 1) Folding Operation
- 2) Shifting Operation
- 3) Multiplication Operation
- 4) Integration Operation
- 5) None of these

Answer : 4) Integration Operation
Solution : Integration Operation is not associated with the computation process of linear convolution.

- **(8)** Which type of system response to its input represents the zero value of its initial condition?

- 1) Zero state response
- 2) Zero input response
- 3) Total response
- 4) Natural response

- 5) None of these

Answer : 1) Zero state response

Solution : The zero state response (ZSR), also known as the forced response is the behavior or response of a circuit with initial state of zero. The ZSR results only from the external inputs or driving functions of the circuit and not from the initial state. The ZSR is also called the forced or driven response of the circuit.

- **(9)** Which among the following belongs to the category of non-recursive systems?

- 1) Non-causal IIR Systems
- 2) Causal IIR Systems
- 3) Non-causal FIR Systems
- 4) Causal FIR Systems
- 5) None of these

Answer : 4) Causal FIR Systems

Solution : Causal FIR Systems is non-recursive systems.

- **(10)** Damped sinusoids are _____

- 1) sinusoid signals multiplied by growing exponentials
- 2) sinusoid signals divided by growing exponentials
- 3) sinusoid signals multiplied by decaying exponentials
- 4) sinusoid signals divided by decaying exponentials
- 5) None of these

Answer : 3) sinusoid signals multiplied by decaying exponentials

Solution : Damped sinusoids are sinusoid signals multiplied by decaying exponentials

- **(11)** Under which conditions does an initially relaxed system become unstable ?

- 1) only if bounded input generates unbounded output
- 2) only if bounded input generates bounded output
- 3) only if unbounded input generates unbounded output
- 4) only if unbounded input generates bounded output
- 5) None of these

Answer : 1) only if bounded input generates unbounded output

Solution : only if bounded input generates unbounded output

- **(12)** All causal systems must have the component of

- 1) memory
- 2) time invariance
- 3) stability
- 4) linearity
- 5) None of these

Answer : 1) memory
Solution : All causal systems must have the component of memory

- **(13)** A system is said to be defined as non causal, when

- 1) the output at the present depends on the input at an earlier time
- 2) the output at the present does not depend on the factor of time at all
- 3) the output at the present depends on the input at the current time
- 4) the output at the present depends on the input at a time instant in the future
- 5) None of these

Answer : 4) the output at the present depends on the input at a time instant in the future
Solution : A non causal system's output is said to depend on the input at a time in the future.

- **(14)** A time invariant system is a system whose output

- 1) vanishes with a delay in input
- 2) remains same with a delay in input
- 3) decreases with a delay in input
- 4) increases with a delay in input

Answer : 2) remains same with a delay in input
Solution : A time invariant system's output should be directly related to the time of the output. There should be no scaling, i.e. y(t) = f(x(t)).

- **(15)** A system which is linear is said to obey the rules of

- 1) homogeneity
- 2) scaling
- 3) additivity
- 4) both scaling and additivity
- 5) None of these

Answer : 4) both scaling and additivity
Solution : A system is said to be additive and scalable in order to be classified as a linear system.

- **(16)** Double integration of a unit step function would lead to

- 1) an impulse
- 2) a parabola
- 3) a ramp
- 4) a doublet
- 5) None of these

Answer : 2) a parabola
Solution : Double integration of a unit step function would lead to a parabola.

- **(17)** A signal g(t) = A then g(t) is a

- 1) energy signal
- 2) power signal
- 3) neither energy nor power signal
- 4) insufficient data
- 5) both 1 & 2

Answer : 2) power signal
Solution : A signal g(t) = A then g(t) is a power signal.

- **(18)** The Fourier series of an odd periodic function contains

- 1) odd harmonics only
- 2) even harmonics only
- 3) cosine harmonics only
- 4) sine harmonics only
- 5) None of these

Answer : 4) sine harmonics only
Solution : The Fourier series of an odd periodic function contains sine harmonics only

- **(19)** As per time displacement theorem in Laplace transformation, displacement in the time domain by T becomes

- 1) division by s in the s domain
- 2) division by e^{-sT} in the s domain
- 3) multiplication by s in the s domain
- 4) multiplication by e^{-sT} in the s domain
- 5) None of these

Answer : 4) multiplication by e^{-sT} in the s domain
Solution : £f(t - T) = e^{-st} F(s).

- **(20)** The signal defined by the equations f(t) = 0 for t < 0, f(t) = E for 0 ≤ t ≤ a and f(t) = 0 for t > a is

- 1) a step function
- 2) a pulse function
- 3) a shifted step function originating at t = a
- 4) unit step function
- 5) None of these

Answer : 2) a pulse function
Solution : The signal defined by the equations f(t) = 0 for t < 0, f(t) = E for 0 ≤ t ≤ a and f(t) = 0 for t > a is a pulse function

- **(21)** Which one of the following is correct? Energy of a power signal is

- 1) finite
- 2) zero
- 3) infinite
- 4) between 1 and 2
- 5) None of these

Answer : 3) infinite
Solution : Energy of a power signal is infinite

- **(22)** Auto correlation function

- 1) is an even function of t
- 2) is an odd function of t
- 3) may be an even or odd function of t
- 4) is both an odd and even function of t
- 5) None of these

Answer : 1) is an even function of t
Solution : Auto correlation function is an even function of t

- **(23)** In RLC circuits the state variables generally selected are

- 1) voltages across capacitors
- 2) currents through resistances and voltages across capacitors
- 3) currents through resistances and capacitances
- 4) currents through inductances and voltages across capacitances
- 5) None of these

Answer : 4) currents through inductances and voltages across capacitances
Solution : In RLC circuits the state variables generally selected are currents through inductances and voltages across capacitances.

- **(24)** The theoretical power of white noise is

- 1) infninite
- 2) depend upon frequency of signal
- 3) finite
- 4) zero
- 5) None of these

Answer : 2) depend upon frequency of signal
Solution : The theoretical power of white noise is depend upon frequency of signal

- **(25)** If f(t) is an even function, the coefficients F_n in the exponential form of Fourier series

- 1) are real
- 2) are imaginary
- 3) are complex
- 4) may be real or imaginary
- 5) None of these

Answer : 1) are real
Solution : If f(t) is an even function, the coefficients Fn in the exponential form of Fourier series are real

- **(26)** For a _____ channel, we need to use the Shannon capacity to find the maximum bit rate.

- 1) noisy
- 2) noiseless
- 3) bandpass
- 4) low-pass
- 5) low rate

Answer : 1) noisy
Solution : For a noisy channel, we need to use the Shannon capacity to find the maximum bit rate.

- **(27)** For a _____ channel, the Nyquist bit rate formula defines the theoretical maximum bit rate.

- 1) noisy
- 2) noiseless
- 3) bandpass
- 4) low-pass
- 5) low rate

Answer : 2) noiseless
Solution : For a noiseless channel, the Nyquist bit rate formula defines the theoretical maximum bit rate.

- **(28)** Baseband transmission of a digital signal is possible only if we have a ____ channel.

- 1) low-pass
- 2) bandpass
- 3) low rate
- 4) high rate
- 5) None of these

Answer : 1) low-pass
Solution : Baseband transmission of a digital signal is possible only if we have a low-pass channel.

- **(29)** The _____ of a composite signal is the difference between the highest and the lowest frequencies contained in that signal

- 1) frequency
- 2) period
- 3) bandwidth
- 4) amplitude
- 5) None of these

Answer : 3) bandwidth
Solution : The bandwidth of a composite signal is the difference between the highest and the lowest frequencies contained in that signal

- **(30)** A sine wave in the _____ domain can be represented by one single spike in the _____ domain.

- 1) time; frequency
- 2) frequency; time
- 3) time; phase
- 4) phase; time
- 5) None of these

Answer : 1) time; frequency
Solution : A sine wave in the time domain can be represented by one single spike in the frequency domain.

- **(31)** _____is the rate of change with respect to time.

- 1) Amplitude
- 2) Time
- 3) Frequency
- 4) Voltage
- 5) None of these

Answer : 3) Frequency
Solution : Frequency is the rate of change with respect to time.

- **(32)** What does the spectral density function of any signal specify?

- 1) Distribution of energy or power
- 2) Consumption of energy or power

- 3) Conservation of energy or power
- 4) Generation of energy or power
- 5) None of these

Answer : 1) Distribution of energy or power
Solution : the spectral density function of any signal specify distribution of energy or power

- **(33)** The ESD of a real valued energy signal is always _____

- 1) An even (symmetric) function of frequency
- 2) An odd (non-symmetric) function of frequency
- 3) A function that is odd and half-wave symmetric
- 4) None of the above

Answer : 1) An even (symmetric) function of frequency
Solution : The ESD of a real valued energy signal is always n even (symmetric) function of frequency

- **(34)** Where does the maximum value of auto-correlation function of a power signal occur?

- 1) At origin
- 2) At extremities
- 3) At unity
- 4) At infinity
- 5) None of these

Answer : 1) At origin
Solution : At origin the maximum value of auto-correlation function of a power signal occur.

- **(35)** What would happen if the value of term $[(m-x) / (\sigma \sqrt{2})]$ increases in the expression of Guassian CDF?

- 1) Complementary error function also goes on increasing
- 2) Complementary error function goes on decreasing
- 3) Complementary error function remains constant or unchanged
- 4) Cannot predict
- 5) None of these

Answer : 2) Complementary error function goes on decreasing
Solution : if the value of term $[(m-x) / (\sigma \sqrt{2})]$ increases in the expression of Guassian CDF
Complementary error function goes on decreasing

- **(36)** What is the value of an area under the conditional PDF ?

- 1) Greater than '0' but less than '1'
- 2) Greater than '1'
- 3) Equal to '1'
- 4) Infinite
- 5) None of these

Answer : 3) Equal to '1'
Solution : the value of an area under the conditional PDF equal to 1

- **(37)** According to Rayleigh's theorem, it becomes possible to determine the energy of a signal by_____

- 1) Estimating the area under the square root of its amplitude spectrum
- 2) Estimating the area under the square of its amplitude spectrum
- 3) Estimating the area under the one-fourth power of its amplitude spectrum
- 4) Estimating the area exactly half as that of its amplitude spectrum
- 5) None of these

Answer : 2) Estimating the area under the square of its amplitude spectrum
Solution : According to Rayleigh's theorem, it becomes possible to determine the energy of a signal by Estimating the area under the square of its amplitude spectrum.

- **(38)** Where is the ROC defined or specified for the signals containing causal as well as anti-causal terms?

- 1) Greater than the largest pole
- 2) Less than the smallest pole
- 3) Between two poles
- 4) Cannot be defined

Answer : 3) Between two poles
Solution : ROC defined Between two poles for the signals containing causal as well as anti-causal terms.

- **(39)** According to the time-shifting property of Laplace Transform, shifting the signal in time domain corresponds to the _____

- 1) Multiplication by e^{-st0} in the time domain
- 2) Multiplication by e^{-st0} in the frequency domain
- 3) Multiplication by e^{st0} in the time domain
- 4) Multiplication by e^{st0} in the frequency domain
- 5) None of these

Answer : 2) Multiplication by e^{-st0} in the frequency domain
Solution : According to the time-shifting property of Laplace Transform, shifting the signal in time domain corresponds to the Multiplication by e^{-st0} in the frequency domain

- **(40)** Which result is generated/ obtained by the addition of a step to a ramp function ?

- 1) Step function of zero slope
- 2) Ramp function of zero slope
- 3) Ramp Function shifted by an amount equal to step
- 4) Step Function shifted by an amount equal to ramp
- 5) None of these

Answer : 3) Ramp Function shifted by an amount equal to step
Solution : Ramp Function shifted by an amount equal to step by the addition of a step to a ramp function.

- **(41)** Generally, the convolution process associated with the Laplace Transform in time domain results into_____

- 1) Simple multiplication in complex frequency domain
- 2) Simple division in complex frequency domain
- 3) Simple multiplication in complex time domain
- 4) Simple division in complex time domain
- 5) None of these

- **(42)** The tree selected for the formation of state equations contains

- 1) all voltage sources
- 2) all capacitors
- 3) all inductors and current sources
- 4) all voltage sources and maximum number of capacitors
- 5) None of these

Answer : 4) all voltage sources and maximum number of capacitors
Solution : The tree selected for the formation of state equations contains all voltage sources and maximum number of capacitors

- **(43)** For a second order system, damping ratio ζ is such that $0 < \zeta <$. Then the roots of characteristic equation are

- 1) real but not equal
- 2) imaginary
- 3) complex conjugate
- 4) real and equal

- 5) None of these

Answer : 3) complex conjugate
Solution : For a second order system, damping ratio ζ is such that 0 < ζ <. Then the roots of characteristic equation are complex conjugate

- **(44)** The inverse Laplace transform of $1/(s - a)^2$ is

- 1) e^{at}
- 2) $t\ e^{at}$
- 3) $t^2\ e^{at}$
- 4) e^{at}/t
- 5) t/e^{at}

Answer : 2) $t\ e^{at}$
Solution : The inverse Laplace transform of $1/(s - a)^2$ is $t\ e^{at}$

- **(45)** The discrete time system describes by $y(n) = x(n^2)$ is

- 1) non-casual, non-linear, time variant
- 2) non-casual, Linear, time invariant
- 3) casual, non-linear, timevari
- 4) casual, Linear, time varying
- 5) casual, Linear, time invariant

Answer : 4) casual, Linear, time varying
Solution : The discrete time system describes by $y(n) = x(n^2)$ is casual, Linear and time varying

- **(46)** The integral of k u(t) is

- 1) 1/k δ(t)
- 2) k δ(t)
- 3) a ramp of slope 1/k
- 4) a ramp of slope k
- 5) None of these

Answer : 4) a ramp of slope k
Solution : The integral of k u(t) is a ramp of slope k

- **(47)** In a complex wave, the negative half of the wave is a reproduction of the positive half wave. Then

- 1) the wave does not contain triple harmonics
- 2) the wave does not contain odd harmonics

- 3) the wave does not contain even harmonics
- 4) the wave contains only fundamental and third harmonic

Answer : 3) the wave does not contain even harmonics
Solution : In a complex wave, the negative half of the wave is a reproduction of the positive half wave. Then the wave does not contain even harmonics

- **(48)** Which of the following is/are not a property/properties power spectral density function Sx(ω)?

- 1) Sx(ω) is real function of ω
- 2) Sx(ω) is a even function of ω
- 3) Sx(ω) is a odd function of ω
- 4) Sx(ω) is non-positive function of ωSx(ω) ≤ 0 for all ω
- 5) All of the above

Answer : 4) Sx(ω) is non-positive function of ωSx(ω) ≤ 0 for all ω
Solution : Properties of power spectral density function Sx(ω):
Sx(ω) is real function of ω
Sx(ω) is a even function of ω
Sx(ω) is a odd function of ω

- **(49)** For Ergodic Process

- 1) ensemble Average equal to time Average
- 2) ensemble Average is not equal to time Average
- 3) ensemble Average > Time Average
- 4) ensemble Average < Time Average
- 5) both 1 & 3

Answer : 1) ensemble Average equal to time Average
Solution : For Ergodic Process ensemble Average equal to time Average

- **(50)** FIR digital filter having _____ stability than FIR filter.

- 1) good stability
- 2) poor stability
- 3) stability not guarnteed
- 4) poor stability
- 5) None of these

Answer : 1) good stability
Solution : FIR digital filter having good stability stability than FIR filter.