BRAINWARE UNIVERSITY
Term End Examination 2020 - 21
Programme – Bachelor of Technology in Computer Science & Engineering
Course Name – Signals and Systems
Course Code - ESC(CSE)501
Semester / Year - Semester V

Time allotted : 85 Minutes   Full Marks : 70

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]
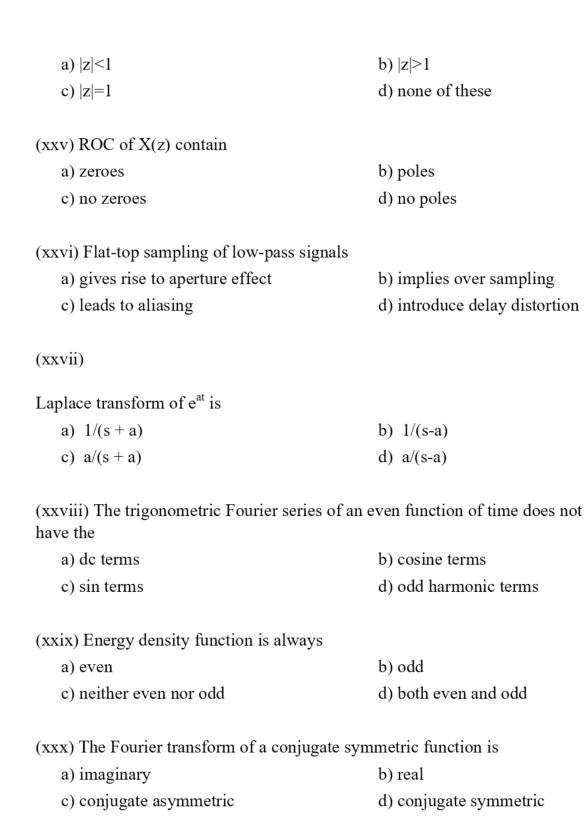
Group-A

(Multiple Choice Type Question)   1 x 70=70

1.   *(Answer any Seventy)*

(i) A signal is a physical quantity which does not vary with _____

a) time   b) space

c) independent variables   d) dependent variables

(ii) Which one of the following is not a characteristic of a deterministic signal?

a) exhibits no uncertainty   b) instantaneous value can be accurately predicted

c) exhibits uncertainty   d) can be represented by a mathematical equation

(iii)

Determine the odd component of the signal $x(t) = t^2 + \sin t$

a) $\sin t$ b) $2\sin t$

c) $\cos t$ d) $2\cos t$

(iv) For an energy signal power is_____

a) P = 20   b) P = infinity

c) none of these   d) P = 0

(v) Discrete time signal is derived from continuous time signal by

_____ process

a) addition

b) multiplying

c) division

d) none of these

(vi) When x(t) is said to be periodic signal?

a) if the equation x (t) = x (t + T) is satisfied for all values of T

b) if the equation x (t) = x (t + T) is satisfied for only one value of T

c) if the equation x (t) = x (t + T) is satisfied for no values of T

d) if the equation x (t) = x (t + T) is satisfied for only odd values of T

(vii) Noise generated by an amplifier is an example of

a) discrete signal

b) deterministic signal

c) random signal

d) periodic signal

(viii) What is a fundamental period?

a) every interval of a periodic signal

b) every interval of an aperiodic signal

c) the first interval of a periodic signal

d) the last interval of a periodic signal

(ix) The power of the signal x(t) = 5cos (50t) is

a) 25W

b) 12.5W

c) 250W

d) 125W

(x) A LTI system is said to be causal system only if _____

a) zero input produces zero output

b) zero input produces an output equal to unity

c) zero input produces non-zero output

d) none of these

(xi) What is the possible range of frequency spectrum for discrete time Fourier series ?

a)

b)

0 to 2π $-\pi$ to $+\pi$

c)   d) none of the these

both 0 to 2π and $-\pi$ to $+\pi$

(xii) If a periodic signal has an odd symmetry then the Fourier series contains
  a) only sine terms   b) both sine and cosine terms
  c) only cosine terms   d) none of these

(xiii) If x(t) is odd, then its Fourier series coefficients must be
  a) imaginary and even   b) real and even
  c) imaginary and odd   d) real and odd

(xiv) If X(f) represents the Fourier transform of a signal x(t), which is real odd
symmetric in time, then
  a) X(f) is complex   b) X(f) is imaginary
  c) X(f) is real   d) X(f) is real and non-negative

(xv)

The period of the function sin5000πt is

  a) 1/25 sec   b) 25 sec
  c) 50 sec   d) none of these

(xvi) The system y(t) = x(3t − 6) is
  a) linear, time variant   b) linear, time invariant
  c) nonlinear, time variant   d) nonlinear, time invariant

(xvii) Minimum sampling rate for a signal of bandwidth fm
a) fs = fm
b) fs =8fm
c) fs =4fm
d) none of these

(xviii) The spectrum of a rectangular pulse is
a) gaussian function
b) sinc function
c) triangular function
d) rectangular function

(xix) A band pass signal extends from 1 kHz to 2 kHz. The minimum sampling frequency needed to retain all information in the sampled signal is
a) 1 kHz
b) 2 kHz
c) 3 kHz
d) 4 kHz

(xx) What is the Nyquest frequency for the signal, x(t) =3cos50nt +10sin300nt – cosnt?
a) 50 Hz
b) 100 Hz
c) 200 Hz
d) 300 Hz

(xxi) All causal systems must have the component of
a) memory
b) time invariance
c) stability
d) linearity

(xxii) All real time systems concerned with the concept of causality are
a) non causal
b) causal
c) neither causal nor non causal
d) memory less

(xxiii) Should real time instruments like oscilloscopes be time invariant?
a) yes
b) sometimes
c) never
d) they have no relation with time variance

(xxiv) ROC of unit step function is

a) |z|<1

b) |z|>1

c) |z|=1

d) none of these

(xxv) ROC of X(z) contain

a) zeroes

b) poles

c) no zeroes

d) no poles

(xxvi) Flat-top sampling of low-pass signals

a) gives rise to aperture effect

b) implies over sampling

c) leads to aliasing

d) introduce delay distortion

(xxvii)

Laplace transform of e^{at} is

a) $1/(s + a)$

b) $1/(s-a)$

c) $a/(s + a)$

d) $a/(s-a)$

(xxviii) The trigonometric Fourier series of an even function of time does not have the

a) dc terms

b) cosine terms

c) sin terms

d) odd harmonic terms

(xxix) Energy density function is always

a) even

b) odd

c) neither even nor odd

d) both even and odd

(xxx) The Fourier transform of a conjugate symmetric function is

a) imaginary

b) real

c) conjugate asymmetric

d) conjugate symmetric

(xxxi) The Fourier series coefficient bn contains

a) only cosine terms

b) only sine terms

c) only dc and cosine terms

d) only dc and sine terms

(xxxii)

The period of the signal $x(t)=10\sin(12\pi t)+4\cos(18\pi t)$ is

a)

$\pi/4$

b) 1/6

c) 1/9

d) 1/3

(xxxiii) If the output of the discrete-time LTI system is always identical to the input signal, then the unit-impulse response h(n) is

a) unit step

b) unit impulse

c) ramp

d) all of these

(xxxiv) The signal $x(t) = \cos 2t$ is

a) periodic with period ?

b) periodic with period 2

c) periodic with period 4?

d) aperiodic

(xxxv)

The period of the function $\cos[\pi/4(t-1)]$ is

a) 1/8 second

b) 8 second

c) 4 second

d) 1/4 second

(xxxvi)

A system with input x(t) & output y(t) is given as y(t) = sin(5/6πt) x(t). The system is

a) linear, stable & invariant
b) non-linear, stable & variant
c) linear, stable & variant
d) linear, unstable & invariant

(xxxvii)

The system defined as y(t)=2x(t) 3x(t²)is

a) static and causal
b) dynamic and causal
c) static and non-causal
d) dynamic and non-causal

(xxxviii) A signal is a power signal if

a) average power is finite and energy is infinite
b) average power is infinite and energy is finite
c) both average power and energy are infinite
d) both average power and energy are finite

(xxxix)

Determine if the systems described by the following input-output equations are linear or non-linear. (1) y(n) = x²(n); (2) y(n) = nx(n)

a) equ.1 is linear but 2 is non-linear
b) equ. 2 is linear but 1 is non-linear
c) equ. 1 and 2 both are linear
d) equ.1 and 2 both are non-linear

(xl) Which of the following signals is power signal?

a)

$x(n) = (⅓)^n u(n)$

b)

$x(n) = e^{jπn}$

c)

d)

$x(n)=e^{2n}u(n)$ $x(n)=e^{2n}u(n+1)$

(xli) Which one of the following is not a ramp function?

  a)   b) $r(t) = 0$ when $t < 0$

  $r(t) = t$ when $t \geq 0$

  c)   d)

  $r(t) = \int u(t)dt$ when $t < 0$ $du(t)/dt$

(xlii) What is the relation between the unit impulse function(d) and the unit ramp function(r)?

  a) $r = dd(t)/dt$ b) $d = dr/dt$

  c)   d)

  $d = d^2(r)/dt^2$ $r = d^2(d)/dt^2$

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

  a) zero initial condition   b) non-zero initial condition

  c) zero final condition   d) non-zero final condition

(xliv) What are the mathematical tools to convert a system from a time domain to frequency domain?

  a) fourier series, fourier transform, laplace b) fourier series only
  transform and z-transform

  c) fourier series and laplace transform only d) fourier series, fourier transform and laplace transform only

(xlv)

If x(t) is both real and even, then $X(j\Omega)$ will be

a) real and odd

b) imaginary and odd

c) real and even

d) imaginary and even

(xlvi) Which among the following systems are described by partial differential functions?

a) causal systems and dynamic systems

b) distributed parameter systems and linear systems

c) distributed parameter systems and dynamic systems

d) causal systems and linear systems

(xlvii) The signal x(t) = sin 2t is

a) energy

b) power

c) None of these

d) both energy and power

(xlviii) Determine the odd component of the ramp signal x(t) =r(t)

a) 1?9

b) 2?9

c) 1?3

d) none of above

(xlix) Determine the odd component of the signal x(t) =u(t)

a) sint

b) 2sint

c) cost

d) none of these

(l) TheRamp function r (t) is integral of _____ with respect to time t

a) Ramp function

b) Impulse function

c) Sinusoidal function

d) Step function

(li)

Unit impulse $\partial(t)$ is _____ of time t.

   a) Odd function   b) Even function
   c) Neither even nor odd function   d) Odd function of even amplitude

(lii) Which mathematical notation specifies the condition of periodicity for a continuous time signal?

   a) $x(t) = x(t + T)$ b) $x(n) = x(n + N)$
   c)   d) none of these

$x(t) = e^{-\alpha t}$

(liii)

Inverse Laplace of $1/s^2$

   a) Ramp   b) Step
   c) unit delay   d) impulse

(liv) Inverse Laplace of $1/(s+2)$

   a) parabolic   b) Step
   c) unit delay   d) none of these

(lv) Step response is the intregal of

   a) Impulse response   b) Ramp response
   c) Sinusoidal response   d) none of these

(lvi) Inverse z transform of 1

   a) parabolic   b) Step
   c) unit delay   d) impulse

(lvii) Inverse z transform of z/(z-1)

a) parabolic

b) Step

c) unit delay

d) impulse

(lviii) The system y(n) = x (n) x(n-1) is

a) dynamic and linear

b) dynamic and time variant

c) causal and time invariant

d) noncausal and time variant

(lix) Energy of Sin 2t is

a) finite

b) infinite

c) 1

d) none of these

(lx) The frequency of a continuous time signal x(t) changes on transformation from x(t) to x(4t), by a factor

a) 4

b) 8

c) 10

d) none of these

(lxi) What is the Nyquest frequency for the signal of 50Hz

a) 50 Hz

b) 100 Hz

c) 200 Hz

d) 300 Hz

(lxii) The function which has its Z transform, unity is

a) gaussian

b) impulse

c) sinc

d) ramp

(lxiii) ROC of X(z) does not contain

a) zeroes

b) poles

c) no zeroes

d) 1

(lxiv)   inverse laplace of 1

a) step

b) sine

c) cosine   d) none of above

(lxv)

Find the Nyquist rate (in Hz) and Nyquist interval (in Sec) for the signal f(t) =
rect(200t).

a)   b)

infinity, 0   infinity, 1

c)   d) none of the above

infinity, 5

(lxvi)

The sampling frequency of a signal is F_s = 2000 samples per second. Find its
Nyquist interval.

a) 1msce   b) 5msce

c) 5sec   d) none of these

(lxvii)

Which of the following is the process of 'aliasing'?

a) over laping   b)

                                                  Spectral overlapping

c)   d) none of these

Amplitude overlapping

(lxviii)

What are the number of samples present in an impulse response called as?

a) array

b) length

c) string

d) none of these

(lxix)

ROC of z transform can't contain-

a) zero

b) one

c) pole

d) none of the above

(lxx)

In laplace transform in function changes through-

a) A domain

b) B domain

c) C domain

d) S domain