BRAINWARE UNIVERSITY

Term End Examination 2020 - 21

Programme – Bachelor of Technology in Electronics & Communication Engineering

Course Name – Signals and Systems

Course Code - PCC-EC303

Semester / Year - Semester III

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) Most of the signals found in nature are _____

a) continuous-time and discrete-time b) continuous-time and digital

c) digital and analog d) analog and continuous-time

(ii) Sum of two periodic signals is a periodic signal when the ratio of their time periods is _____

a) a rational number b) an irrational number

c) a complex number d) an integer

(iii)

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

a) sint b) 2sint

c) cost d) 2cost

(iv) Determine the even components of the signal x(t) = cost + sint + costsint

a) sint b) cost

c) 2cost d) 2sint

(v) For an energy signal power is_____

a) P = 20 b)

$P = \infty$

c) none of these

d) P = 0

(vi) Discrete time signal is derived from continuous time signal by _____ process

a) addition

b) multiplying

c) division

d) None of these

(vii) 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

(viii) . Noise generated by an amplifier is an example of

a) discrete signal

b) deterministic signal

c) random signal

d) periodic signal

(ix) 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

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

a) 25W

b) 12.5W

c) 250W

d) 125W

(xi) 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

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

a) 0 to 2π

b) $-\pi$ to $+\pi$

c) both 0 to 2π & $-\pi$ to $+\pi$

d) none of these

(xiii) 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

(xiv) 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

(xv) 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

(xvi) The period of the function sin5000?t is

a) 1/25 sec

b) 25 sec

c) 50 sec

d) None of these

(xvii) The system y(t) = x(3t – 6) is

a) linear, time variant

b) linear, time invariant

c) nonlinear, time variant

d) nonlinear, time invariant

(xviii) The system y(t +2) + y(t + 1) = x (t +2) is

a) causal and memory less
b) causal and has memory
c) causal
d) not causal

(xix) The spectrum of a rectangular pulse is

a) gaussian function
b) sinc function
c) triangular function
d) rectangular function

(xx) 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

(xxi) 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

(xxii) All causal systems must have the component of

a) memory
b) time invariance
c) stability
d) linearity

(xxiii) 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

(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) Which of the following rules determines the mapping of s-plane to z-plane?

a) right half of s-plane maps into outside of unit circle in z-plane
b) left half of s-plane maps into inside of unit circle in z-plane
c) imaginary axis of s-plane maps into circumference of unit circle in z-plane
d) all of these

(xxviii)

Laplace transform of e^{at} is

a) 1/(s+a)
b) 1/(s-a)
c) a/(s+a)
d) a/(s-a)

(xxix) 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

(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 b_n 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)

b) 1/6

$\pi/4$

c) 1/9

d) 1/3

(xxxiii) The signal x(t) = cos2t is

a) periodic with period ?

b) periodic with period 2

c) periodic with period 4?

d) aperiodic

(xxxiv) If a signal f(t) has an energy E, the energy of the signal f(2t) is equal to

a) E

b) E/2

c) 2E

d) 4E

(xxxv)

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

a) linear, stable & invariant

b) non-linear, stable & variant

c) linear, stable & variant

d) linear, unstable & invariant

(xxxvi)

$x(t)= a \sin wt$ is an

a) odd signal

b) even signal

c) both odd and even signal

d) none of these

(xxxvii) 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

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

a) $x(n) = (\frac{1}{3})^n u(n)$

b) $x(n) = e^{j\pi n}$

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

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

(xxxix) What is the value of u(1), where u(t) is the unit step function?

a) 1

b) 0.5

c) 0

d) -1

(xl) Which theorem states that the total average power of a periodic signal is equal to the sum of average powers of the individual Fourier coefficients?

a) parseval's theorem

b) rayleigh's theorem

c) both parseval's and rayleigh's theorem

d) none of these

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

a) zero state response

b) zero input response

c) total response

d) natural response

(xlii) When does a signal say to be bounded?

a) when it is stable

b) when it gives slow responses

c) magnitude does not grow without bound

d) when it has small inputs

(xliii) What is Laplace transform of unit impulse?

a) 1 b) 2

c) 0 d) 5

(xliv)

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

(xlv) 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

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

a) energy b) power

c) None of these d) All of these

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

a) b)

1/9 2/9

c) d) None of these

1/3

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

a) sint
b) 2sint
c) cost
d) None of these

(xlix) For an Power signal _____

a) E = 0
b) $P = \infty$
c) $E = \infty$
d) P = 0

(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) Unit RampR(t) is _____ of time t.

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

(liii)

$\partial(at) = 1/a\ \partial(t)$, this property of unit impulse is called _____

a) Time Shifting
b) Time Scaling
c) Amplitude Scaling
d) Time Reversal

(liv) Which among the following operations are involved with the computation process of linear convolution?

a) folding operation
b) shifting operation
c) multiplication operation
d) All of these

(lv) Inverse Laplace of 1/(s-2)

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

(lvi) impulse response is the derivative of

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

(lvii) z transform of impulse

a) 1
b) 2
c) 5
d) 100

(lviii) The system $y(t) = x(4t – 5)$ is

a) linear, time variant
b) linear, time invariant
c) nonlinear, time variant
d) nonlinear, time invariant

(lix) The system $y(n +2) + y (n + 1) = x (n +2)$ is

a) causal and memory less
b) causal and has memory
c) causal
d) not causal

(lx) A band pass signal extends from 2 kHz to 4 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

(lxi) The frequency of a continuous time signal x(t) changes on transformation

from x(t) to x(8t), by a factor

a) 4 b) 8

c) 10 d) none of these

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

a) gaussian b) impulse

c) sinc d) ramp

(lxiii) Determine the even components of the signal x(t) = cost + 70 sint

a) sint b) cost

c) 2cost d) 2sint

(lxiv) What is the nature of Fourier representation of a discrete & aperiodic signal?

a) continious & periodic b) continious & aperiodic

c) discrete d) none of above

(lxv) Inverse z transform of 1

a) impulse b) step

c) ramp d) none of above

(lxvi) ROC of z transform can't contain-

a) pole b) zero

c) 1 d) none of above

(lxvii) in laplace transform in function changes through-

a) A domain b) B domain

c) C domain d) S domain

(lxviii) For stable system which of the following is correct

a) $z<1$ b) $z=1$

c) $z>1$

d) none of above

(lxix)

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

a) 0.5sec

b) 1sec

c) 5msec

d) none of above

(lxx)

Find the Nyquist rate and Nyquist interval of sinc[200t].

a)

200 Hz,

$\frac{1}{200}$

b)

200 Hz,

$\frac{1}{400}$

c)

100 Hz,

$\frac{1}{200}$

d) none of above