SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : SIGNALS AND SYSTEMS(18EC403) **Course & Branch**: B.Tech - EEE

Year & Sem: II B.Tech & II Sem **Regulation:** R18

UNIT –I

INTRODUCTION TO SIGNALS AND SYSTEMS

SHORT ANSWER QUESTIONS (2 MARKS)

1. Define a Signal. What is the relation between impulse, step, ramp and parabolic signals? [L1][CO1][2M]
2. How are the signals are classified? [L1][CO1][2M]
3. Define Unit impulse and Unit step Signals. [L1][CO1][2M]
4. Distinguish between periodic and non-periodic signals [L4][CO1][2M]
5. Distinguish causal and anti-causal signals. [L4][CO1][2M]
6. Define Linear and Non-Linear System [L1][CO1][2M]
7. Define time-variant and time-invariant systems. [L1][CO1][2M]
8. How are systems classified? [L1][CO1][2M]
9. Define stable and unstable systems. [L1][CO1][2M]
10. Define causal and non-causal systems. [L1][CO1][2M]

LONG ANSWER QUESTIONS (10 MARKS)

1. Define various elementary signals in continuous time and discrete time and indicate them graphically [L1][CO1][10M]
2. What are the basic operations on signals? Illustrate with an example. [L1][CO1][10M]
3. Explain the classification of signals in both continuous time and discrete time with suitable examples. [L2][CO1][10M]
4. (a) Find which of the signals are causal or non-causal. [L1][CO1][05M]
   (i) $x(t)= e^{2t}u(t-1)$ (ii) $x(t)=3\ \text{sinc}\ 2t$ (iii) $x(n)=u(n+4)-u(n-2)$ (iv) $x(t)=u(-n)$
   (b) Sketch the following signals [L1][CO1][05M]
   (i) $2\,u(t+2)- 2\,u(t-3)$ (ii) $u(t+4)\,u(-t+4)$ (iii) $r(t)-r(t-1)-r(t-3)-r(t-4)$ (iv) $\pi(t-2)$
5. Find whether the following signals are periodic or not? If periodic determine the fundamental Period
   (a) $\sin 12\pi t$ (b) $3\sin 200\pi t+4\cos 100t$ (c) $\sin 10\pi t+\cos 20\pi t$
   (d) $\sin(10t+1)- 2\cos(5t-2)$ (e) $e^{j4\pi t}$ [L1][CO1][10M]
6. (a) Find the even and odd components of the following signals [L1][CO1][05M]
   (i) $x(t)= e^{j2t}$ (ii) $x(t) =(1+t^2+t^3)\cos^2 10t$ (iii) $x(n)=\{-3,1, \underset{\uparrow}{2}, -4,2\}$ (iv) $x(n)=\{5,4,\underset{\uparrow}{3},2,1\}$
   (b) Determine whether the following signals are energy signals or power signals. Calculate their energy or power? [L1][CO1][05M]
   (i) $x(t)= 8\cos 4t\cos 6t$ (ii) $\sin^2 \omega_0 t$ (iii) $x(t)= e^{j[3t+(\pi/2)]}$ (iv) $x(n)=(1/2)^n u(n)$
7. Define a system. How are systems classified? Define each one of them. [L4][CO1][10M]
8. Check whether the following system is [L1][CO1][10M]
   (a) Static or dynamic (b) linear or non- linear
   (c) Causal or non- causal (d) Time invariant or time variant

(i)$d^3y(t)/dt^3+2d^2y(t)/dt^2+4\ dy(t)/dt+3y^2(t)=x(t+1)$

(ii)$d^2y(t)/dt^2+2y(t)\ dy(t)/dt+3ty(t)=x(t)$

9. Check whether the following system is [L1][CO1][10M]

(a) Static or dynamic (b) linear or non- linear

(c) Causal or non- causal (d) Time invariant or time variant

(i)$y(n)=\log_{10}|x(n)|$ (ii) $y(n)=x^2(n)+1/x^2(n-1)$ (iii) $y(t)=at^2\ x(t)+bt\ x(t-4)$

10.(a) Check whether the following systems are causal or not? [L1][CO1][05M]

(i)$y(t)=x^2(t)+x(t-4)$ (ii) $y(t)=x(t/2)$ (iii)$y(n)=x(2n)$

(b) Find whether the following systems are stable or not [L1][CO1][05M]

(i) $y(t)=(t+5)\ u(t)$ (ii) $y(t)=(2+e^{-3t})\ u(t)$ (iii) $h(n)=a^n$ for $0<n<11$

UNIT –II

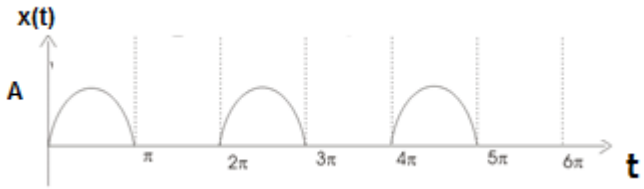
FOURIER SERIES AND FOURIER TRANSFORM

SHORT ANSWER QUESTIONS

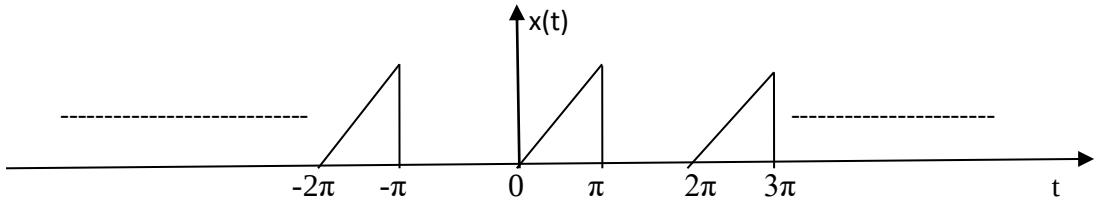
1. What is Fourier Series. [L1][CO2][2M]
2. What is the three important classes of Fourier series methods available. [L1][CO2][2M]
3. What are the Dirichlet's conditions? State them. [L1][CO2][2M]
4. What is the Relationship between exponential Fourier series and trigonometric Fourier series coefficients? [L1][CO2][2M]
5. How do you obtain Cosine Fourier series from exponential Fourier series? [L1][CO2][2M]
6. Differentiate the Fourier series and Fourier transform. [L1][CO2][2M]
7. What is Fourier transform? [L1][CO2][2M]
8. Define Linearity Property of Fourier Transform [L1][CO2][2M]
9. What are the Merits of Fourier Transform? [L1][CO2][2M]
10. Define Fourier transform and Inverse Fourier transform of discrete time signal. [L1][CO2][2M]

LONG ANSWER QUESTIONS

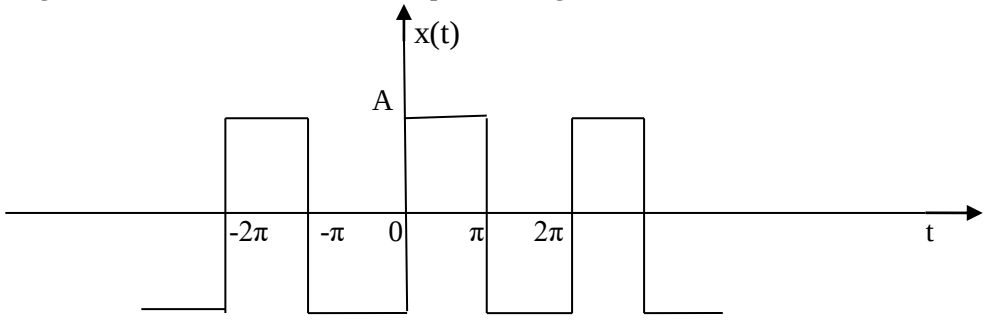
1. Find the Fourier series expansion of the half wave rectified sine wave shown in figure. [L1][CO2][10M]



2. State and Prove any Five Properties of the Fourier Series. [L3][CO2][10M]
3. Find the trigonometric Fourier series for the periodic signal $x(t)$ shown in below [L3][CO2][10M]



4. Explain about exponential Fourier series and derive the Fourier series coefficient [L1][CO2][10M]
5. Find the trigonometric Fourier series for the periodic signal $x(t)$ shown in below.



6. (a) Find the Fourier transform of the following [L1][CO2][05M]
(i) sgn(t) (ii) sin $\omega_0 t$ (iii)cos $\omega_0 t$ (iv) 1(Constant Amplitude)
(b). Find the Fourier transform of the following [L1][CO2][5M]
(i) impulse function (ii) $x(t)=e^{-at}u(t)$ (iii) $x(t)=e^{j\omega ot}$ (iv) x(t)=u(t)
7. State and Prove the properties of Continuous time Fourier transform? [L1][CO2][10M]
8. Find the Fourier transform of the following signals [L1][CO2][10M]
(i) $x(t)=e^{-3t}u(t)$ (ii) $x(t)=te^{-at}u(t)$ (iii) $x(t)=e^{-t}\sin 5t\, u(t)$ (iv) $x(t)=e^{-t}\cos 5t\, u(t)$
9. Find the inverse Fourier transform of the following signals [L1][CO2][10M]
(i) $X(w)=\frac{4(jw)+6}{(jw)2+6(jw)+8}$ (ii) $X(W)=\frac{1+3(jw)}{(jw+3)2}$ (iii) $X(w)=e^{-2w}u(w)$
10. (a) State and prove any three properties of the DTFT. [L2][CO2][5M]
(b) Find the Fourier Transform of the Signal (i) Triangular Pulse (ii) $e^{-a|t|}$ [L1][CO2][5M]

UNIT –III

SIGNAL TRANSMISSION THROUGH LINEAR SYSTESMS

SHORT ANSWER QUESTIONS

1. What are the properties of LTI systems? [L1][CO3][2M]
2. Define transfer function of a system? [L1][CO3][2M]
3. Define impulse response of a system. [L1][CO3][2M]
4. What is a filter? How are filters classified? [L1][CO3][2M]
5. What is the Relation between unit step and impulse response? [L1][CO3][2M]
6. Define sampling and sampling period? [L1][CO3][2M]
7. State Sampling theorem [L1][CO3][2M]
8. What is Nyquist rate and Nyquist interval? [L1][CO3][2M]
9. What is anti-aliasing filter? [L1][CO3][2M]
10. State Sampling theorem? [L1][CO3][2M]

LONG ANSWER QUESTIONS

1. (a) Explain the Filter characteristics of linear systems explain with neat diagrams [L1][CO3[5M]
(b) Define the following (i)Impulse Response (ii)Step Response (iii) Response of the System [L1][CO3][5M]
2. (a) Derive the transfer function and impulse response of an LTI system. [L1][CO3][5M]
(b) Define Linear time variant, Linear time-invariant, step response of the system. [L2][CO3][5M]
3. Discuss the properties of linear time invariant systems. [CO3][10M]
4. (a) Consider a stable LTI System characterized by the differential equation dy(t)/dt+2y(t)=x(t), Find its impulse response. [L3][CO3][5M]
(b) Find the Nyquist Rate and Nyquist Interval of the following signals. [L2][CO3][5M]
(i)x(t)=1+cos 2000 πt + sin 4000 πt (ii) x(t)=10 sin 40πt cos 300πt
5. (a) Let the system function of an LTI system be 1/(jω+2). What is the output of the system for an input $(0.8)^t u(t)$? [L3][CO3][5M]
(b) Consider a causal LTI system with frequency response H(ω)=1/4+jω, for a input x(t), the system is observed to produce the output $y(t)=e^{-2t}u(t)- e^{-4t}u(t)$. Find the input x(t). [L1][CO3][5M]

6. Consider a stable LTI system that is characterized by the differential equation [L3][CO3][10M]
$d^2y(t)/dt^2+4dy(t)/dt+3y(t)= dx(t)/dt+2x(t)$ find the response for an input $x(t)=e^{-t}u(t)$.
7. Find the Nyquist rate and Nyquist interval for the following signals [L1][CO3][10M]

(i) x(t)=1+cos 2000 πt +sin 4000 πt (ii) 10 sin 40πt cos 300πt
(iii)x(t)=sinc (100 πt) + 3 $sinc^2$ (60 πt) (iv) x(t)= 2 sinc (100 πt)

8. State and prove the sampling theorem for the band-limited signals with the help of graphical representation. [L1][CO3][10M]
9. (a) Discuss about Effects of the under sampling. [L4][CO3][05M]
(b) A system produces an output of y(t)= e^{-3t} u(t) for an input of x(t)= e^{-5t} u(t). Determine the impulse response and frequency response of the system. [L3][CO3][05M]
10. A signal x(t) = 2 cos 400πt + 6 cos 640πt is ideally sampled at fs= 500 Hz . If the sampled signal is passed through an ideal LPF with a cut off frequency of 400Hz, what frequency components will appear in the output? Find the output signal. [L3][CO3][10M]

UNIT –IV

CONVOLUTION AND CORRELATION OF SIGNALS

SHORT ANSWER QUESTIONS

1. What is convolution? State the shift property of convolution. [L1][CO4][2M]
2. State Time convolution and Frequency convolution theorem [L1][CO4][2M]
3. What is correlation and types of correlation? [L1][CO4][2M]
4. What are the properties of cross correlation for energy signals? [L1][CO4][2M]
5. What are the properties of auto correlation for power signals? [L1][CO4][2M]
6. What is the relation between convolution and correlation? [L1][CO4][2M]
7. What are the Properties of ESD? [L1][CO4][2M]
8. Differentiate ESD and PSD? [L1][CO4][2M]
9. State Parseval's energy theorem? [L1][CO4][2M]
10. State Parseval's power theorem? [L1][CO4][2M]

LONG ANSWER QUESTIONS

1. (a) Write the properties of convolution. [L1][CO4][05M]
(b) Find the convolution of the following signal $x_1(t)= e^{-2t}\, u(t)$, $x_2(t)=e^{-4t}\, u(t)$ [L1]CO4][05M]
2. (a) State and prove the time convolution theorem with Fourier transforms. [L1][CO4][05M]
(b) State and prove the frequency convolution theorem with Fourier transforms. [L1][CO4][05M]
3. (a) Derive the relation between convolution and correlation. [L2][CO4][05M]
(b). Write the properties of cross correlation for energy signals [L1][CO4][05M]
4. (a) State and prove the Parseval's theorem for energy signals. [L3][CO5][05M]
(b) State and prove the Parseval's theorem for power signals. [L3][CO4][05M]
5. (a) Derive and Define the properties of Energy Spectral Density. [L1][CO4][05M]
(b) Derive and Define the properties of Power Spectral Density [L1][CO4][05M]
6. (a) Show that R(r) and ESD form Fourier transform pair. [L1][CO4][05M]
(b) Show that R(r) and PSD form Fourier transform pair. [L1][CO4][05M]
7. (a) Verify Parseval's theorem for the energy signal x(t)=e^{-4t} u(t). [L2][CO4][05M]
(b) Determine the autocorrelation function and energy spectral density of x(t)=e^{-at} u(t). [L3][CO4][05M]

8. (a) Find the autocorrelation of the signal x(t)= a sin ($\omega_0 t + \theta$).

[L3][CO4][05M]

(b) Distinguish the ESD and PSD.

[L4][CO4][05M]

9. (a) Explain the detection of periodic signals in the presence of noise by auto correlation.

[L1][CO4][05M]

(b) Explain the detection of periodic signals in the presence of noise by cross correlation

[L1][CO4][05M]

Explain the extraction of noise by Filtering.

10. Explain the extraction of a signal from noise by filtering.

[L1][CO4][10M]

UNIT –V

LAPLACE TRANSFORMS AND Z-TRANSFORMS

SHORT ANSWER QUESTIONS

1. What is the Region of Convergence (ROC)? [L1][CO5][2M]
2. What is the relation between Laplace transform and Fourier transform? [L1][CO5][2M]
3. State initial value theorem and final value theorem of Laplace transform. [L1][CO5][2M]
4. What are the properties of ROC? [L1][CO5][2M]
5. What is the Laplace Transform of Parabolic Function.? [L1][CO5][2M]
6. What is the relation between Discrete-time Fourier transform and Z-transform? [L1][CO5][2M]
7. What is the Z-transform of unit step signal? [L1][CO5][2M]
8. Find Z-transform and ROC of $x(n)=(1/2)^n u(n-2)$ [L1][CO5][2M]
9. State the Convolution Property of Z-transform [L1][CO5][2M]
10. Discuss the comparison of Laplace and Z-Transform. [L1][CO5][2M]

LONG ANSWER QUESTIONS

1. State and prove the any five Properties Laplace Transform [L3][CO5][10M]
2. (a) Find the Laplace transform of the signal $x(t)= e^{-at} u(t) - e^{-bt} u(-t)$ and also find its ROC [L1][CO5][05M]

   (b) Find the Laplace transforms and region for the following signals [L1][CO5][05M]

   (i)$x(t)=e^{-5t} u(t-1)$ (ii)$x(t)=e^{2t} \sin 2t$ for $t \leq 0$ (iii) $x(t)=t\, e^{-2|t|}$
3. Find the Laplace transform of the following signals using properties of Laplace transform [L1][CO5][10M]

   (i) $x(t)=t\, e^{-t} u(t)$ (ii) $x(t)=t\, e^{-2t} \sin 2t\, u(t)$ (iii)$x(t)= \sin at/t$ (iv) $x(t)=1-e^{t}/t$
4. Find the inverse Laplace transform of the following [L1][CO5] [10M]

   (a)$X(s) = 1/ s(s+1) (s+2) (s+3)$ (b) $X(s)= (3s^2+22s+27)/(s^2+3s+2)(s^2+2s+5)$

   (c) $X(s)=s/(s+3)(s^2+4s+5)$
5. (a) Find the convolution of the sequences:

   (i) (ii) [L1][CO5][05M]

   (b) Discuss about the Properties of the ROC of Laplace transform [L3][CO5][05M]
6. (a) State and prove time differentiation and time integration property of Laplace transform [L1][CO5][05M]

   (b). Find the Laplace transform for any 5 standard signals [L1][CO5][05M]
7. Find the inverse z-transform of: [L1][CO5][05M]

   $X(z)=3z^{-1}/(1-z^{-1})\,(1-2z^{-1})$

   (a)If ROC; $|z|>2$ (b) If ROC ; $|z|<1$ (c) If ROC ; $1<|z|<2$
8. (a) Find the inverse Z-transform of X(z) given $X(z) = 1/(1-az^{-1})$, ROC; $z|>|a|$ [L1][CO5][05M]

   (b) Find the convolution of the sequences: [L1][CO5] [05M]

   $x_1(n)=(1/2)^n u(n)$ and $(1/3)^{n-2}u(n)$
9. (a) State and prove initial and final value theorems of Z-transform? [L3][CO5][05M]

   (b) Using the Properties of Z-transform. Find the Z-transform of following signals [L1][CO5][05M]

   (i) $x(n)=u(-n)$ (ii) $x(n)=2^n u(n-2)$ (iii) $2(3)^n u(-n)$

10. (a) Prove that the final value of x(n) for $X(z) = z^2/(z-1)(z-0.2)$ is 1.25 and its final value is unity? [L3][CO5] [05M]

(b). Find the inverse Z-transform of $X(z)= z^{-1}/(3-4z^{-1}+z^{-2})$, ROC: $|z|>1$ [L1][CO5][05M]

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QUESTION BANK (OBJECTIVE)

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UNIT – I

INTRODUCTION TO SIGNALS AND SYSTEMS

1. In continuous time signal, independent variable nature is_____ [ ]

A) Continuous B) Discrete C) Exponential D) None

2. In discrete time signal, independent variable nature is_____ [ ]

A) Continuous B) Discrete C) Exponential D) None

3. Generally x (t + 2) means [ ]

A) x (t) delayed by 2 units B) x(t) advanced by 2 units C) x(t) delayed by 4 units D) none

4. Generally x(t - 2) means [ ]

A) x(t) delayed by 2 units B) x(t) advanced by 2 units C) x(t) delayed by 4 units D) none

5. Generally x(2n) means [ ]

A) Expansion version of x(n) B)Compression version of x(n)

C) Delayed version of x(n) D)none

6. Generally x(n/2) means [ ]

A) Expansion version of x(n) B) Compression version of x(n)

C) Delayed version of x(n) D) none

7. A discrete signal is said to be periodic signal, it satisfy _____ condition [ ]

A) x(n)= x(2n) B) x(n)= x(n+N) C) x(t)= x(t+T) D) None

8. _____ is the fundamental period of x(n)=cos0.02πn [ ]

A) 1/100 B) 100 C) 200 D) None

9. A signal is said to be even signal, it satisfy _____ condition [ ]

A) x(-t) = x(t) B) x(-t) = -x(t) C) $x(t) = x(t^2)$ D) None

10. A signal is said to be energy signal, it satisfy _____ condition [ ]

A) $0<E<\infty$ & $p=0$ B) $0<E<\infty$ & $p=\infty$ C) $0<E<\infty$ & $p=1$ D) None

11. A signal is said to be power signal, it satisfy _____ condition [ ]

A) $0<p<\infty$ & $E=0$ B) $0<p<\infty$ & $E=\infty$ C) $0<p<\infty$ & $E=1$ D) None

12. Following statement is true for unit impulse signal [ ]

$\delta(n)=1$ for $n\neq0$ B) $\delta(n) = 1$ for $n=0$ C) $\delta(n)=0$ for $n=0$ D)None

13. Following statement is true for unit step signal [ ]

A) $u(n)=1$ for $n<0$ B) $u(n) =1$ for $n>0$ C) $u(n)=1$ for $n=0$ D)None

14. _____ is the relation between unit impulse &unit step signal [ ]

A) $\delta(n)= u(n)-u(n-1)$ B) $\delta(n)=u(n)$ C) $\delta(n)=u(n)=u(n-1)$ D)None

15. Following statement is true for continuous time unit step [ ]

A) $u(t)=1$ for $t>0$ B) $u(t)=1$ for $t<0$ C) $u(t)=1$ for $t=0$ D) None

16. A system is said to be linear system, it satisfy ---- [ ]

A) superposition property B)homogeneity property C)a& b D) None

17. $y(t)=2\,x(t)$, system is linear or nonlinear [ ]

A) Linear B) Nonlinear C) both D) None

18. $y(t)=\sin x(t)$,then system is time variant or time invariant [ ]

A) Time variant B) Time invariant C) both D) None

19. $y(n)=2\,x(n)-x^2(n)$, system is memory or memory less [ ]

A) Memory less B) memory C) both D) none

20. $y(n)=x(n-1)$,system is causal or non-causal [ ]

A) Non causal B) causal C)both D) none

21. Generally $x(t+3)$ means [ ]

A) x(t) delayed by 3 units B)x(t) advanced by 3 units C) both D) None

22. A continuous signal is said to be periodic signal, it satisfy _____ condition [ ]

A) $x(n)= x(2n)$ B) $x(n)= x(n+N)$ C) $x(t)= x(t+T)$ D) None

23. _____ is the fundamental period of $x(n)=\cos 0.04\pi n$ [ ]

A) 100 B) 200 C) 300 D) 50

24. $y(t)=8\,x(t)$, system is linear or nonlinear [ ]

A) Linear B) nonlinear C) both D) None

25. --- is example for memory system [ ]

A) Capacitor B) inductor C) resistor D) None

26. Generally $x(4n)$ means [ ]

A) Expansion version of x(n) B)Compression version of x(n)

C) Delayed version of x(n) D)none

27. Generally x(t-3) means [ ]

A) x(t) delayed by 3 units B) x(t) advanced by 3 units C) both D) None

28. y(n)=x(n)+x(n-1),system is memory or memory less [ ]

A) Memory B) memory less C) both D) None

29. Fourier series is used to analyze ---- signals [ ]

A) Periodic B) non periodic C) both D) none

30. For the existence of Fourier series, Dirichlet's conditions are [ ]

A) Necessary B) Sufficient C) Necessary and sufficient D) none

31. The net areas of sinusoids over complete periods are [ ]

A) Finite B)Infinite C) Zero D) none

32. In the trigonometric Fourier series representation of a signal, a_0 is the [ ]

A) RMS value B) Mean Square Value C) Peak Value D) Average Value

33. In the trigonometric Fourier series representation of an even function consists of [ ]

A) Cosine terms B) Sine terms C) both sine and cosine D) None

34. The coefficient a_n is zero for ---------- functions [ ]

A) Even B) Odd C) both A and B D) None

35. In the trigonometric Fourier series representation of an ODD function consists of [ ]

A) Cosine terms B) Sine terms C) both sine and cosine D) None

36. The coefficient b_n is zero for ---------- functions [ ]

A) Even B) Odd C) both A and B D) None

37. The mostly used Fourier series is [ ]

A) Trigonometric series B) Exponential series C) Cosine series D) None

38. The frequency spectrum of non periodic signal is [ ]

A) Continuous B) Discrete C) both continuous and discrete D) None

39. The time domain representation of a signal graphically is called [ ]

A) Waveform B) Spectrum C) Magnitude D) None

40. The frequency spectrum of a periodic signal is [ ]

A) Continuous B) Discrete C) both continuous and discrete D) None

UNIT – II

FOURIER SERIES and FOURIER TRANSFORMS

1. The Fourier transform may be applied to [ ]

   A) Aperiodic B) Periodic C) Both periodic & Aperiodic D) Neither periodic or periodic

2. The spectrum of triangular pulse is

   A) Gaussian function B) Sinc function C) $Sinc^2$ function D) Rectangular function

3. The Fourier transform of $CosW_0t$ is [ ]

   A). $\pi[\delta(\omega + \omega_0) - \delta(\omega - \omega_0)]$ B). $j\pi[\delta(\omega + \omega_0) + \delta(\omega - \omega_0)]$

   C). $\pi[\delta(\omega + \omega_0) + \delta(\omega - \omega_0)]$ D). $j\pi[\delta(\omega + \omega_0) - \delta(\omega - \omega_0)]$

4. The Fourier transform of the exponential signal $e^{j\omega_0 t}$ is **[AE 2006]** [ ]

   A) a constant (B) a rectangular gate (C) an impulse (D) a series of impulses

5. The Fourier transform of $SinW_0t$ is [ ]

   A) $\pi[\delta(\omega + \omega_0) - \delta(\omega - \omega_0)]$ B) $j\pi[\delta(\omega + \omega_0) + \delta(\omega - \omega_0)]$

   C) $\pi[\delta(\omega + \omega_0) + \delta(\omega - \omega_0)]$ D) $j\pi[\delta(\omega + \omega_0) - \delta(\omega - \omega_0)]$

6. The Fourier transform of t x(t) is [ ]

   A) $\frac{dX(j\omega)}{d\omega}$ B) j $\frac{dX(j\omega)}{d\omega}$ C) $\frac{X(j\omega)}{\omega}$ D) $\frac{jdX(j\omega)}{d\omega}$

7. The Fourier transform of $e^{-at}u(t)$ is **[GATE 2000]** [ ]

   A) $\frac{1}{a-j\omega}$ B) $\frac{1}{a+j\omega}$ C) $\frac{1}{a^2+\omega^2}$ D) $\frac{1}{a^2-\omega^2}$

8. The Fourier transform for a function x(t) exists when [ ]

   A) $\int_{\infty}^{\infty} f(t)dt = \infty$ B) $\int_{\infty}^{\infty} |f(t)|dt < \infty$ C) $\int_{\infty}^{\infty} |f(t)|dt = \infty$ D) $\int_{\infty}^{\infty} f(t)dt > \infty$

9. The Fourier transform of u(t) is [ ]

   A) $\frac{1}{j\omega}$ B) $j\omega$ C) $\frac{1}{1+j\omega}$ D) $\pi\delta(\omega) + \frac{1}{j\omega}$

10. The Fourier transform of $e^{j\omega_0 t}x(t)$ is [ ]

    A) $X(\omega + \omega_0)$ B) $X(\omega_0)$ C) $X(\omega - \omega_0)$ D) $X(\frac{\omega}{\omega_0})$

11. Parseval's identity states that $\int_{\infty}^{\infty} |f(t)|^2 dt =$ [ ]

    A). $\int_{\infty}^{\infty} X_1(\omega)X_2^*(\omega)d\omega$ B). $\frac{1}{2\pi}\int_{\infty}^{\infty} X_1(\omega)X_2^*(\omega)d\omega$

    C). $\frac{1}{2\pi}\int_{\infty}^{\infty} X_1^*(\omega)X_2^*(\omega)d\omega$ D). $2\pi\int_{\infty}^{\infty} X_1(\omega)X_2^*(\omega)d\omega$

12. The Fourier transform of $x^*(t)$ is [ ]

A) $X^*(\omega)$ B) $X^*(-\omega)$ C) $-X^*(\omega)$ D) $-X^*(-\omega)$

13. The Fourier transform of $\frac{dx(t)}{dt}$ is [ ]

A) $\frac{d\omega}{\omega}X(\omega)$ B) $\frac{1}{\omega}X(\omega)$ C) $j\omega X(\omega)$ D) $\frac{j\omega}{X(\omega)}$

14. The Fourier transform of x(at)= [ ]

A) $\frac{1}{|a|}X\left(\frac{\omega}{a}\right)$ B) $\frac{1}{|a|}X(a\omega)$ C) $\frac{1}{|a|}X\left(\frac{a}{\omega}\right)$ D) $\frac{1}{|\omega|}X\left(\frac{\omega}{a}\right)$

15. The Fourier transform of a unit impulse function $\delta(t)is$ [ ]

A)1/ω B) 1 C) ω D) 1/jω

16. The Fourier transform of $\delta(t-t_0)is$ [ ]

A) $e^{j\omega t_0}$ B) $e^{-j\omega t_0}$ C) e^{-jt_0} D) $\delta(t-t_0)$

17. The Fourier transform of $e^{-at}\,u(t)$ is [ ]

A) $\frac{1}{a^2+w^2}$ B) $\frac{1}{a-jw}$ C) $\frac{1}{a+jw}$ D) $\frac{1}{a^2-w^2}$

18. The Fourier transform of x(-t) is [ ]

A) X(ω) B) X($-\omega$) C) $X(\frac{1}{\omega})$ D) -X(ω)

19. The FT of $x_1(n)*x_2(n)$ is [ ]

A) X1(ω) X(ω) B)X1(ω)X2(ω) C)X1(ω) $*$ X2(ω) D) Doesn't exits

20. The FT of $\delta(t)is$ [ ]

A) 0 B)1 C) ∞ D) not defined

21. The F.T of d2/dt [x(t-2)] is [ ]

A) X(jω/2)/-ω^2 B) -ω^2X(jω/2) C) X(jω) ej2ω D) -ω^2 $e^{-j2}\omega$x(jω)

22. The FT of x(n)*h(n) is [ ]

A)X(ω)H(ω) B)X(ω)*H(ω) C)X(ω)H($-\omega$) D)X(ω)*H(-ω)

23. The FT of analog signal consists of a spectrum with frequency range [ ]

A)-π to π B) 0 to 2 π C)0 to ∞ D)- ∞ to ∞

24. The DTFT of x(n)= 2^nu(n) is [ ]

(A) $1/1-2e^{-j\Omega}$ (B) $e^{j\Omega}/1-2e^{-j\Omega}$ (C)$1/1+2e^{-j\Omega}$ (D) none

25. DTFT is a special case of [ ]

(A) Z- transform (B) Laplace transform (C) continuous time F.T (D) none

26. Z transform of x(n) is the DTFT of [ ]

(A) x(n)r-n (B) x(n)rn (C) x(n)u(n) (D) x(n)r(n)

27. The F.T of u(t) is [ ]

(A) πδ(ω) (B) 1/jω (C) 1/jω (D) None

28. The inverse F.T of jω/(1+1/jω)2 is---------- [ ]

(A) (t-1) e-t u(t) (B) (1-t) e-t u(t) (C) (1+t) e-t u(t) (D) -(1+t) e-t u(t)

29. The frequency response of LTI system is given by the FT of the ____of the system [ ]

A) transfer function B)output C)impulse function D)input

30. The FT of x(n)*h(n) [ ]

A) X(ω)H(ω) B) X(ω)*H(ω) C) X(ω)H(−ω) D) X(ω)*H(-ω)

31. The FT of analog signal consists of a spectrum with frequency range [ ]

A) -π to π B) 0 to 2 π C) 0 to ∞ D) - ∞ to ∞

32. The FT of a discrete-time signal is unique in the range [ ]

A) -π to π B) 0 to 2 π C) 0 to ∞ D) - ∞ to ∞

33. The FT of $\delta(n)is$ [ ]

A) 0 B) 1 C) ∞ D) not defined

34. The FT of u(n) [ ]

A) 1/1-$e^{j\omega}$ B) 1/1-$e^{-j\omega}$ C) 1/1- ω D) 1/1-j ω

35. The FT of a^nu(n) [ ]

A) 1/1-a$e^{j\omega}$ B)1/1-a$e^{-j\omega}$ C)1/1-ja ω D)1/1+aj ω

36. The FT of $-a^n$u(-n-1) is [ ]

A) 1/1-a$e^{j\omega}$ B)1/1-a$e^{-j\omega}$ C)1/1-ja ω D)1/1+aj ω

37. The FT of 2^nu(n) is [ ]

A) 1/1-2$e^{j\omega}$ B)1/1-2$e^{-j\omega}$ C) 1/1+2$e^{j\omega}$ D) doesnot exists

38. The FT of $\delta(n+2)-\delta(n-2)$ is [ ]

A) 2j sin2 ω B) 2 cos2 ω C) sin2 ω D) cos2 ω

39. The FT of x(n) cosω_0n is [ ]

A) 1/2{X(ω+ ω_0)+ X(ω-ω_0)} B) ½{X(ω+ ω_0)+ X(ω+ ω_0)}

C) X(ω) D) none

40. The FT of x(-n) is [ ]

A) X(ω) B) X(−ω) C) X(ω + 1) D) none

UNIT –III

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS

1. The characteristics of an LTI system are completely characterized by its [ ]
   A) Impulse response B) step response C) transfer function D) none
2. For defining a transfer function, the initial conditions must be taken as [ ]
   A) Zero B) infinite C) finite D) none
3. The spectral density function of the input signal x(t) is given by [ ]
   A) X(ω) B) H(ω) C) Y(ω) D) $X^2(\omega)$
4. A linear time invariant system with an impulse response h(t) produces output y(t) when an input x(t) is applied. When an input x(t-τ) is applied to a system with a impulse response h(t-τ),the output will be**(Gate-2009)** [ ]
   A) Y(τ) B) Y(2(t-τ)) C) Y(t-τ) D) Y(t2τ)
5. The probability density function of the envelope of narrow band Gaussian noise is [ ]
   A) Poisson B) Gaussian C) Rayleigh D) Rician
6. The significance of PSD is [ ]
   A) amplitude B) frequency C) unit band width D) phase
7. The PSD of a real valued random process is function of frequency [ ]
   A) Even B) odd C) symmetric D) unsymmetric
8. A linear system possesses the important property of [ ]
   A) superposition B) variation C) constancy D) none
9. A system whose behavior and characteristics of the system are fixed over time is called [ ]
   A) time variant B) time invariant C) linear D) none
10. for distortion less transmission the magnitude H(w) is [ ]
    A) Zero B) Infinite C) Constant D) linear
11. A transmission is said to be__ if the response of the system is exact replica of the input signal
    A) noise less B) distortion less C) causal D) none [ ]
12. T[$\delta(n)$] = [ ]
    A) h(n) B) H(s) C) H(n) D)none
13. In time domain, a linear system is described in terms of its [ ]
    A) unit step B)ramp C)impulse response D)none
14. for distortion less transmission the phase must be [ ]
    A) Zero B) Infinite C) Constant D) linear
15. for distortion less system, the response must be_____ of the input signal [ ]
    A) Exact replica B) different C) non-linear D) none

16. In time variant system, if y(n)=H[x(n)] then y(n-k)= [ ]

A) H[x(n+k)] B) h[x(n-k)] C) h[x(n+k)] D) none

17. _____ criterion is a test which distinguish between a physically realizable characteristics from an unrealizable [ ]

A) Paley wiener B) drichlet's C) Pascal's D) none

18. $\int_{-\infty}^{\infty} |H(\omega)|^2 d\omega$ should be [ ]

A) >0 B)=0 C)<∞ D)none

19. For distortion transmission the system bandwidth must be equal to [ ]

A) Signal bandwidth B) infinite C) ½ signal bandwidth D) 2 times signal bandwidth

20. A system is defined by impulse response $h(n)=2^n u(n-2)$.the system is **(Gate2011)** [ ]

A) Linear B) nonlinear C) unstable D) stable

21. y(n)= 3x(n+3) [ ]

A) Linear B) nonlinear C) both D) None

22. ---- filter passes high frequency signals [ ]

A) Low pass B) high pass C) band pass D) None

23. y(n)= k Δx(n), where Δx(n)= [x(n+1)-x(n)] [ ]

A) Linear B) nonlinear C) both D) None

24. $h(t)=e^{-2t}u(t-1)$ [ ]

A) Non causal B) causal C) both D) None

25. $h(t)=e^{-2t}u(t-1)$ [ ]

A) Stable B) unstable C) both D) None

26. Rise time is_____ proportional to the cutoff frequency of the filter [ ]

A) directly B)inversely C) linearly D)none

27. A signal is said to be causal if it is zero for [ ]

A) t=∞ B)t>0 C)t<0 D)none

28. The_____ of a system is arbitrarily defined as the interval of frequencies over which the magnitude |H(ω)| remains with in $1/\sqrt{2}$ times its value at the midband [ ]

A) beam width B) band width C) pulse width D) none

29. The signal distortion depends on the _____ of the system [ ]

A) beam width B) band width C) pulse width D) none

30. In time variant system, if y(n)=H[x(n)] then y(n-k)= [ ]

A) H[x(n+k)] B)h[x(n-k)] C)h[x(n-k)] D)none

31.__criterion is tests which distinguish between a physically realizable characteristics from on unrealizable characteristics [ ]

A) Paley wiener B)drichlet's C)Pascal's D) none

32. ---- filter passes low frequency signals [ ]

A) Low pass B) high pass C) band pass D) None

33. ---- filter passes band of frequency signals [ ]

A) Low pass B) high pass C) band pass D) None

34. An energy signal has G(f)=10.Its energy density spectrum is**(Gate-2011)** [ ]

A) 10 B)100 C)50 D)20

35. Which one is time invariant system?**(Gate-2013)** [ ]

A) y(n)=x(2n) B) y(n)=x(n) x(n-1) C) y(n)=x(n/2) D) none

36. The function δ(t - b) is**(Gate-2010)** [ ]

A) An impulse function B) a step function originating at t = b

C) An impulse function originating at t = b D) None

37. For distortion less transmission the amplitude response is [ ]

A) Zero B) Infinite C) Constant D) linear

38. For distortion less transmission the phase response is [ ]

A) Zero B) linear C) Constant D) linear

39. The output of an LTI system is equal to unit impulse when input is [ ]

A) $\delta(t)$] B) u(t) C) r(t) D) all the above

40. For distortion transmission the bandwidth of the system is [ ]

A) Finite B)infinite C) zero D)very small

UNIT-IV

CONVOLUTION AND CORRELATION OF SIGNALS

1. It is possible to compute the cross correlation Rxy(ŧ) between two signals x(t) and y(t) directly from their convolution provided [ ]
   A) x(t) has even symmetry B) x(t) has odd symmetry
   C) y(t) has even symmetry D) y(t) has odd symmetry
2. x(t)= 10π(t/4) and y(t)= [δ(t-1)+ δ(t-5)].then x(t)*y(t) is [ ]
   A) 10π((t-3)/4) B) 10π((t-4)/4) C) 10 [π((t-3)/4) + π((t-5)/4)] D) none
3. X(t)= 5π(t/4), the waveform of Rxx(ŧ) is [ ]
   A) Rectangular B) triangular C) trapezium D) none
4. X(t)= 10π(t/10), Sxx(f) is [ ]
   A) a sinc function B) a triangular function C) a sinc square function D) a rectangular function
5. X(t)= 5π(t/10), the maximum value of Rxx(ŧ) is [ ]
   A) 250 B) 50 C) 500 D) 25
6. X(t)= 10π(t/10), the maximum value of Sxx(0) is [ ]
   A) 100 B) 1000 C) 500 D) 5000
7. X(t)= 10π(t/10), the total area under the Sxx(f) curve is [ ]
   A) 1000 B) 500 C) 100 D) 10000
8. The signal e-t u(t) is applied as input to an L-section RC low pass filter with time constant =1 The energy spectral density at the output of the filter at the 3-dB cutoff frequency of the filter is [ ]
   A) 1 B) 0.5 C) 0.25 D) 1.5
9. x(n)= {1,-1,2,-2 } Then rxx (0) is [ ]
   A) 0 B) 10 C) 12 D) 8
10. if x(n) is of finite duration and has N samples, rxx (k) wil have a duration of [ ]
    A) 2N samples B) N2 samples C) (2N-1) samples D) (2N+1) samples
11. x(n)=2-n u(n). then rxx (0) is [ ]
    A) 1/3 B) 2/3 C) 1 D) 4/3
12. x(n)=(0.5)-n u(-n). then rxx (0) is [ ]
    A) 4/3 B) 1 C) 2/3 D) 1/3
13. FFT can be used for a computation of [ ]

A) linear convolution but not circular convolution B) circular convolution but not linear convolution C) both linear and circular convolutions D) neither linear nor circular convolutions

14. If $r_{xy}(3)=12$ for x(n)= {4,-2,2,0,4} and y(n)= {3,0,-3,6}, what is $r_{xy}(2)$ if x(n)= {2,-1,1,0,2} and y(n)= {0.5,0,-0.5,1} [ ]

A) 3 B) 2.5 C) 2 D) 1

15. x(n)= {2,-1,3,-2}. What is the value of $r_{xy}(0)$ [ ]

A) 2 B) 1.414 C) 18 D) 4

16. x(n)= {5,5,5,5,5} and y(n)= {20,20, 1.414,20,-30}. The upper bound for $|r_{xy}(k)|$ is [ ]

A) 50 B) 500 C) 100 D) 25

17. The total area under the PSD is equal to the---------- of the signal [ ]

A) Average power B) average energy C) total energy D) total power

18. The convolution of x(t) and h(t) is given by $y(t)= \int_o^t x(\tau)\, h(t-\tau)d\tau$, then [ ]

A) Both x(t) and h(t) are causal B) Both x(t) and h(t) are non-causal

C) x(t) causal and h(t) is non-causal D) h(t) is causal and x(t) is non-causal

19. The convolution of x(t) and h(t) is given by $y(t)= \int_{-\infty}^{\infty} x(\tau)\, h(t-\tau)d\tau$, then [ ]

A) Both x(t) and h(t) are causal B) Both x(t) and h(t) are non-causal

C) x(t) causal and h(t) is non-causal D) h(t) is causal and x(t) is non-causal

20. The convolution of x(t) and h(t) is given by $y(t)= \int_{-\infty}^{t} x(\tau)\, h(t-\tau)d\tau$, then [ ]

A) Both x(t) and h(t) are causal B) Both x(t) and h(t) are non-causal

C) x(t) causal and h(t) is non-causal D) h(t) is causal and x(t) is non-causal

21. The convolution of x(t) and h(t) is given by $y(t)= \int_o^{\infty} x(\tau)\, h(t-\tau)d\tau$, then [ ]

A) Both x(t) and h(t) are causal B) Both x(t) and h(t) are non-causal

C) x(t) causal and h(t) is non-causal D) h(t) is causal and x(t) is non-causal

22. The time convolution theorem states that $F[x_1(t)*x_2(t)]$ = [ ]

A) $X_1(w)X_2(w)$ B) $X_1(w)*X_2(w)$ C) $1/2\pi\ [X_1(w)X_2(w)]$ D) $1/2\pi\ [X_1(w)*X_2(w)]$

23. The frequency convolution theorem states that $F[x_1(t)\, x_2(t)]$ = [ ]

A) $X_1(w)X_2(w)$ B) $X_1(w)*X_2(w)$ C) $1/2\pi\ [X_1(w)X_2(w)]$ D) $1/2\pi\ [X_1(w)*X_2(w)]$

24. The autocorrelation function and PSD form a ----------pair

A) Fourier Transform B) Laplace Transform C) Z- Transform D) Fourier series

25. The condition for orthogonality of two functions $x_1(t)$ and $x_2(t)$ in terms of correlation is [ ]

A) $R_{12}(\tau) = \infty$ B) $R_{12}(\tau) = 0$ C) $R_{12}(\tau) = 1$

D) $R12\ (\tau) = finite$

26. The autocorrelation is maximum at [ ]

A) $\tau = 0$ B) $\tau = \infty$ C) $\tau = 1$ D) $\tau = none$

27. The autocorrelation function and ESD form a ----------pair

A) Fourier Transform B) Laplace Transform C) Z- Transform D) Fourier series

28. The Fourier transform of the cross correlation of two signals $x_1(t)$ and $x_2(t)$ is equal to [ ]

A) $X_1(w)X_2(w)$ B) $X_1(w)*X_2(w)$ C) $X_1^*(w)\ X_2^*(w)$ D) $none$

29. The cross correlation of $x_1(t)$ and $x_2(t)$ is the same as the convolution of [ ]

A) $x_1(t)$ and $x_2(-t)$ B) $x_1(t)$ and $x_2(t)$ C) $x_1(-t)$ and $x_2(t)$ D) $x_1(-t)$ and $x_2(-t)$

30. The distribution of average power of the signal in frequency domain is called----------

A) EDS B) PDS C) EDS and PDS D) None

31. The total area under the EDS is equal to the---------- of the signal [ ]

A) Average power B) average energy C) total energy D) total power

32. The distribution of power or energy of a signal per unit bandwidth is called --------[ ]

A) EDS B) PDS C) EDS and PDS D) None

33. The time convolution theorem states that [ ]

A) x1(t) * x1(t)= X1(w)X2(w) B) x1(t) * x1(t)= X1(w)*X2(w)

C) x1(t) * x1(t)= $1/2\pi$ [X1(w) *X2(w)]D) $x1(t) * x1(t) = 1/2\pi$ [X1(w)X2(w)]

34. The autocorrelation function is maximum at -------- [ ]

A) Origin B) Top C) bottom D) None

35. If $R_{xy}(0)=0$ then the signals are [ ]

A) Orthogonal B) non orthogonal C) both orthogonal and non-orthogonal D) None

36. The convolution of signals with an impulse is equal to [ ]

A) A signal itself B) amplitude different C) time period different D) None

37. The cross correlation of ---------- signals is zero [ ]

A) Orthogonal B) non orthogonal C) both orthogonal and non-orthogonal D) None

38. The autocorrelation function at origin is equal to the------ [ ]

A) Average power B) average energy C) total energy D) total power

39. The distribution of energy of a signal in frequency domain is called---------- [ ]

A) EDS B) PDS C) EDS and PDS D) None

40. Correlation of two signals is a measure of ---------- between those signals [ ]

A) difference B) similarity C) comparison D) None

UNIT-V

LAPLACE TRANSFORM & Z-TRANSFORM

1. If x(t) and its d/dt are laplace transformable and the LT of x(t) is X(s) then $\lim_{t\to\infty} x(t)$ is given by [ ]

   A) $\lim_{s\to\infty} sX(s)$ B) $\lim_{s\to 0} sX(s)$ C) $\lim_{s\to\infty} X(s)/s$ D) $\lim_{s\to 0} X(s)/s$

2. What is the Laplace transform of a delayed unit impulse function δ(t-1)____ [ ]

   A) 1 B) 0 C) e^{-s} D) s

3. What is the Laplace transform of x(t) = e^{-2t}u(t) *tu(t) [ ]

   A) $-1/s^2(s+2)$ B) $-1/s^2(s-2)$ C) $1/s^2(s-2)$ D) 1/s(s-2)

4. The output of a linear system to a unit step input u(t) is t^2e^t the system function H(s) is

   A) $2/s^2(s+2)$ B) $2/(s+2)^2$ C) $2/(s+2)^3$ D) $2s/(s+2)^3$ [ ]

5. Laplace transform of a e^{-at} sinωt is [ ]

   A) $\omega/(s+a)^2+\omega^2$ B) $\omega/(s-a)^2+\omega^2$ C) $\omega/(s-a)^2-\omega^2$ D) $\omega/(s+a)^2-\omega^2$

6. The Impulse response of RL circuit is [ ]

   A) Rising exp B) Decaying exp C) Step D) Parabolic

7. The impulse response of a system is h(t). When the input is δ(t), the output y(t) will be

   A) y(t) B) δ(t) C) h(t) D) None [ ]

8. The convolution of u(t)* u(t) is [ ]

   A) $u^2(t)$ B) tu (t) C) t^2u (t) D) None

9. Laplace transform of d/dx x(t) [ ]

   A) X(s)/s B) X(s) C) s/X(s) D) X(s)

10. The unit step response of a system starting from rest is given by c(t) = 1- e^{-2t} for t≥0 The transfer function is [ ]

    A) 1/(1+2s) B) 2/(s+2) C) 1/(s+2) D) 2s/(1+2s)

11. The transfer function of an LTI system is given by H(s) = e^{-2s} .What is the impulse response of the system [ ]

    A) e^{-2t} u(t) B) u(t-2) C) δ(t-2) D) e^{2t} u(t)

12. X(s) = L[x(t)], then L{d^n/dt^nx(t)} is [ ]

    A) X(s) B) $s^nX(s)$ C) $[X(s)]^n$ D) $d^n/ds^nX(s)$

13. Given x(t) ↔ X(s) be a Laplace transform pair then the inverse Laplace transform of X(s+2j) is

    A) e^{-j2t} x(t) B) e^{-2t} x(t) C) e^{2t} x(t) D) e^{j2t} x(t) [ ]

14. Poles of the a Laplace transform are those complex points at which the transfer function will be [ ]

A) 0 B) 1 C) ∞ D) None

15. The Z transform of conjugation x*(n) is [ ]

A) X*(z*) B) X*(z C) X(z*) D) None

16. The Z transform of multiplication of nx(n) is [ ]

A) z d/dz X(z) B) -z d/dz X(z C) -z ∫ X(z) D) z ∫ X(z)

17. The Z transform of time shifting of a x(n-m) is [ ]

A) $z^{m}X(z)$ B) $z^{m}/X(z)$ C) $z^{-m}X(z)$ D) $z^{-m}/X(z)$

18. Z transform of time function $\sum_{k=0}^{\infty} \delta(n-k)$ is [ ]

A) (z-1)/z B) $z/(z-1)^2$ C) z/ (z-1) D) $(z-1)^2/z$

19. Z transform F(z)function of function f(nT)= $a^{n}T$ [ ]

A) $z/(z-a^{T})$ B) $z/(z+a^{T})$ C) $z/(z-a^{-T})$ D) $z/(z+a^{-T})$

20. The ROC of the Z transform of a unit step function [ ]

A) |z|>1 B) |z|<1 C) Re(Z)>0 D) Re(Z)<0

21. If x(n) and X(z) are the Z transform pair, Z transform of $\sum_{k=-\infty}^{\infty} x(n-k)$ is [ ]

A) $z^{-k}X(z)$ B) z^{-k} C) $\sum_{k=-\infty}^{\infty} z - kX(z)$ D) $\sum_{k=-\infty}^{\infty} z - k$

22. The only signal whose ROC is entire z-plane is [ ]

A) δ(n) B) u(n) C) r(n) D) none

23. Unilateral Z transform of x(n) is equivalent to bilateral Z transform of [ ]

A) x(n)u(n-1) B) x(n)u(n) C) δ(n) D) x(n-1)u(n-1)

24. DTFT is a special case of [ ]

A) Z transform B) Laplace transform C) CTFT D) None

25. ROC is defined as a range values of z for which X(z) [ ]

A) Converges B) Divergence C) zero D) Infinity

26. The ROC of a causal stable system must include the [ ]

A) origin B) Infinity C) Ring D) Unit circle

27. Z transform of x(n) is the DTFT of [ ]

A) $x(n)r^{-n}$ B) $x(n)r^{n}$ C) x(n)u(n) D) x(n)r(n)

28. The Z transform of the signal x(n-2) is [ ]

A) $z^4/(z^2-16)$ B) $(z+2)^2/(z+2)^2-16$ C) $1/(z^2-16)$ D) $(z-2)^2/(z+2)^2-16$

29. If x(n) is right sided, X(z) has a signal pole and x(0)= 2, x(2)= ½ then x(n) is [ ]

A) $u(-n)/2^{n-1}$ B) $u(n)/2^{n-1}$ C) $u(-n)/2^{n+1}$ D) $u(n)/2^{n+1}$

30. The Z transform δ(n) is [ ]

A) -1 B) 0 C) 1 D) ∞

31. In the z-plane ROC of Z transform X(z) consist of [ ]

A) Strips B) Parabola C) Rectangle D) Ring

32. ROC does not contain any [ ]

A) Poles B) Zeros C) Ones D) None

33. Z transform of unit step sequence is [ ]

A) z/(z-1) B) $z/(z-1)^2$ C) z/(z-1) D) $(z-1)^2/z$

34. Mapping $z= e^{st}$ from s-plane to z-plane is [ ]

A) one to one B) many to one C) one to many D) many to many

35. Z transform of time function $\sum_{k=0}^{\infty} \delta(n-k)$ is [ ]

A) (z-1)/z B) $z/(z-1)^2$ C) z/ (z-1) D) $(z-1)^2/z$

36. Z transform F(z)function of function $f(nT)= a^nT$ [ ]

A) $z/(z-a^T)$ B) $z/(z+a^T)$ C) $z/(z-a^{-T})$ D) $z/(z+a^{-T})$

37. The ROC of the Z transform of a unit step function is [ ]

A) |z|>1 B) |z|<1 C) Re(Z)>0 D) Re(Z)<0

38. If x(n) and X(z) are the Z transform pair , Z transform of $\sum_{k=-\infty}^{\infty} x(n-k)$ is [ ]

A) $z^{-k}X(z)$ B) z^{-k} C) $\sum_{k=-\infty}^{\infty} z - kX(z)$ D) $\sum_{k=-\infty}^{\infty} z - k$

39. The Z transform of the signal x(n-2) is [ ]

A) $z^4/(z^2-16)$ B) $(z+2)^2/(z+2)^2-16$ C) $1/(z^2-16)$ D) $(z-2)^2/(z+2)^2-16$

40. If x(n) is right sided, X(z) has a signal pole and x(0)= 2, x(2)= ½ then x(n) is [ ]

A) $u(-n)/2^{n-1}$ B) $u(n)/2^{n-1}$ C) $u(-n)/2^{n+1}$ D) $u(n)/2^{n+1}$

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