Reg. No. : | | | | | | | | | | |

Question Paper Code: 44404

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Fourth Semester

Electronics and Communication Engineering

14UEC404- SIGNALS AND SYSTEM

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Dirac delta function is also called as unit _____ function.

   (a) Ramp (b) Impulse (c) Step (d) Signum

2. A linear system should obey_____ theorem.

   (a) Superposition (b) Hyper position
   (c) Thevenin (d) linearity

3. Fourier transform of Gaussian pulse will be

   (a) another Gaussian pulse (b) squared sinc pulse
   (c) sinc pulse (d) impulse train

4. The frequency response usually represented in graph by its

   (a) magnitude (b) phase
   (c) both magnitude and phase (d) none of these

5. The Laplace transform of *u(t)* is

   (a) $1/s$ (b) s^2 (c) $1/s^2$ (d) s

6. Given that $H(s)=e^{-4s}$.What is the impulse response of the system?

   (a) $\delta(t-4)$ (b) $u(t-4)$ (c) $e^{-4t}u(t)$ (d) $e^{4t}u(t)$

7. The ROC can't contain

   (a) any poles (b) any zeroes
   (c) all poles (d) all zeroes

8. The Z transform of nu(n) is

(a) $\frac{z}{(z-1)^2}$ (b) $\frac{z}{(z-1)^3}$ (c) $\frac{z}{(z-1)^{-2}}$ (d) $\frac{z}{(z-1)^{-2}}$

9. Transfer function of LTI DT System also called as

(a) System function (b) Impulse function
(c) Step function (d) Impulse response

10. The Z-transform of correlation of the sequence x(n) & y(n) is,

(a) $X^*(z)Y^*(Z^{-1})$ (b) $X(z)Y(z^{-1})$ (c) X(z)*Y(z) (d) $X(z^{-1})Y(z^{-1})$

PART - B (5 x 2 = 10 Marks)

11. Find the odd and even components of the signal $x(t)=e^{-10t}$.

12. State Parseval theorem as applied for Fourier series.

13. Find the inverse Laplace transform of $X(s)=1/2[1/s + s/s^2+4]$

14. Define system function of the discrete time system.

15. State the time shifting property of the Z-transform.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Obtain the graphical representation for the following signals. (10)

(a) *x(t) = u(t)+u(t-1)+u(t-2)*

(b) *x[n]={1,2,5,2,-1} plot x[n] ,x[3-n],x[n-2]*

(ii) Test whether the following signal is periodic or not if periodic, calculate the fundamental period.

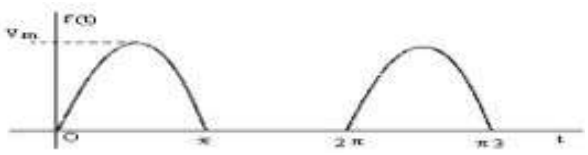
$$x[n]=3\cos[\frac{\pi}{3}n]\sin[\frac{\pi}{2}n]\cos[\frac{\pi}{4}n+\frac{\pi}{2}]$$ (6)

Or

(b) Determine whether the following systems are static , causal, Time invariant , Linear

(i) y(n)=x(4n+1) (ii) y(n)=x(n)+nx(n+1) (iii) $y(n)=\log_{10}x(n)$ v.)$y(n)=x^2(n)$ (16)

17. (a) Determine the trigonometric Fourier series representation for Half Wave Rectified signal. (16)



Or

(b) The input and output of a causal LTI system are described by the differential equation: $d^2y(t)/dt^2 + 3\,dy(t)/dt + 2y(t) = x(t)$.

(i) Calculate the frequency response of the system

(ii) Calculate the impulse response of the system

(iii) Criticize the response of the system if $x(t) = te^{-t}\,u(t)$? (16)

18. (a) State and prove the

(i)Initial value theorem

(ii)Final value theorem of Laplace transform with the help of example. (16)

Or

(b) Estimate the inverse Laplace Transform of the following Equation

(i) $X(s) = S^2+3S+4/S^3+5S^2+7S+3$. (8)

(ii) $X(s) = S^2/S^4+4a^4$. (8)

19. (a) A continuous time sinusoidal signal $\cos(2\pi Ft+\theta)$ is sampled at a rate F_s=1000Hz.Determine the resulting signal samples, if the input signal frequency F is 400 Hz, 600Hz & 1000Hz respectively. (16)

Or

(b) (i) State and Prove Convolution and Multiplication theorem using DTFT. (8)

(ii) Obtain DTFT for the following DT sequence. $x(n)=(1/2)^{n-2}u(n-2)$. (8)

0. (a) Consider the following difference equation $y(n+2)-5y(n+1)+6y(n)= x(n+1)+4x(n)$ with the initial conditions $y(0)=1$;$y(1)=2$.find the step response of the system. (16)

Or

(b) (i) A LTI DT system has the state variable description

$$A = \begin{bmatrix} 2 & -1 \\ 1 & 0 \end{bmatrix}\ B = \begin{bmatrix} 1 \\ 0 \end{bmatrix}\ C = [\,3 \quad 1\,]\ D = [\,2\,]$$

Determine the transfer function of state variable matrix. (10)

(ii) State and prove initial and final value theorem of Z transform. (6)