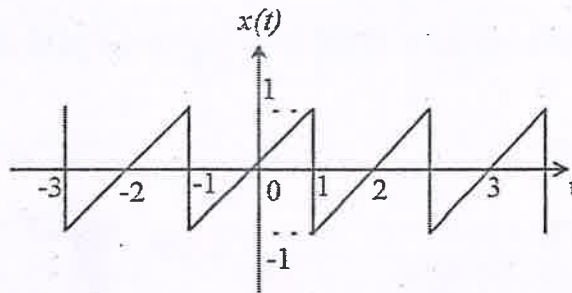


$$(1) y(n) = x(n)x(n-1)$$

$$(2) y(n) = \cos[x(n)]$$

29. a. Find the trigonometric Fourier series of the given signal $x(t)$.



(OR)

b.i. Using partial fraction expansion find inverse Fourier transform for the following

$$(1) X(j\omega) = \frac{5j\omega + 12}{(j\omega)^2 + 5(j\omega) + 6}$$

$$(2) \overline{X(j\omega)} = \frac{1 + 2j\omega}{(j\omega + 2)^2}$$

ii. State and prove the linearity property of Fourier transform.

30. a. A linear time invariant continuous system is specified by the equation

$$\frac{d^2y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 6y(t) = \frac{dx(t)}{dt} + 4x(t). \text{ If the input } x(t) = e^{-t}u(t), \text{ find the forced response of the system.}$$

(OR)

b.i. Derive the expression for the convolution integral.

ii. Find the impulse response of $H(s) = \frac{s+2}{s^2+5s+4}$.

31. a. Find 8 point DFT of $x(n) = \{1, -1, 1, -1, 1, -1, 1, -1\}$.

(OR)

b.i. Find the inverse Fourier transform of $X(e^{j\omega}) = 1 + 2e^{-j\omega} + 2e^{-j2\omega} + 3e^{-j3\omega}$.

ii. Find the Fourier transform of the signal $x(n) = a^{|n|}$.

32. a. Using long division method, determine the inverse Z-transform of $x(z) = \frac{1+2z^{-1}}{1-2z^{-1}+z^{-2}}$.

(OR)

b. Find the impulse response and step response for the following systems

$$y(n) - \frac{3}{4}y(n-1) + \frac{1}{8}y(n-2) = x(n).$$

Reg. No.

B.Tech. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

EC1008 – SIGNALS AND SYSTEMS

(For the candidates admitted during the academic year 2013 – 2014 and 2014 -2015)

Note:

- Part - A** should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
- Part - B** and **Part - C** should be answered in answer booklet.

Time: Three Hours

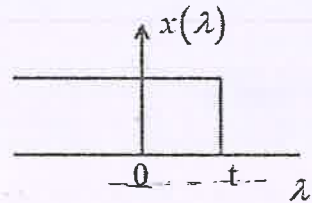
Max. Marks: 100

PART - A (20 × 1 = 20 Marks)

Answer ALL Questions

- If a signal $f(t)$ has energy E, the energy of the signal $f(2t)$ is equal to
(A) E (B) $E/2$
(C) $2E$ (D) $4E$
- The signal $x(t) = 2(\cos \pi t) + 3(\sin 2t)$
(A) Is periodic (B) Is not periodic
(C) May or may not be periodic (D) Stable and periodic
- The system $y(t) = e^{x(t)}$ is
(A) Stable, causal (B) Non causal, stable
(C) Unstable, causal (D) Unstable, non causal
- The system $y(t) = x(3t-6)$ is
(A) Linear, time variant (B) Linear, time invariant
(C) Nonlinear, time variant (D) Non linear, time invariant
- The trigonometric Fourier series of an even function of time does not have the
(A) DC term (B) Cosine terms
(C) Sine terms (D) Odd harmonic terms
- If the Fourier series coefficients of $x(t)$ are C_n , then the Fourier series co-efficients of $x(-t)$ is given by
(A) C_n^* (B) $C - n$
(C) $C^* - n$ (D) C_n
- If a periodic signal has an even symmetry the Fourier series contains
(A) Only sine terms (B) Only cosine terms
(C) Constant and cosine terms (D) Both sine and cosine terms
- The periodic signal is said to have half-wave symmetry when
(A) $x(t) = x\left(t + \frac{T}{2}\right)$ (B) $x(t) = x\left(t - \frac{T}{2}\right)$
(C) $x(t) = -x\left(t \pm \frac{T}{2}\right)$ (D) $x(t) = x\left(t \pm \frac{T}{2}\right)$
- If two system with impulse response $h_1(t)$ and $h_2(t)$ are connected in parallel, then the overall impulse response is
(A) $h_1(t) * h_2(t)$ (B) $h_1(t) + h_2(t)$
(C) $h_1(t) - h_2(t)$ (D) $\sqrt{h_1(t)h_2(t)}$

10. If $x_1(t) = x_2(t) = u(t)$, then $x_1(t) * x_2(t)$ is
 (A) $u(t)$ (B) $u(t^2)$
 (C) $tu(t)$ (D) $\frac{t^2}{2}u(t)$
11. A good measure of similarity between two signal $x_1(t)$ and $x_2(t)$ is
 (A) Convolution (B) Correlation
 (C) Power density spectrum (D) Fourier transform
12. By which of the following equations is the signal $x(\lambda)$ is represented?



- (A) $u(t-\lambda)$ (B) $u(-t-\lambda)$
 (C) $u(\lambda-t)$ (D) $u(t+\lambda)$
13. The direct evaluation DFT requires _____ complex multiplications.
 (A) $N(N-1)$ (B) N^2
 (C) $N(N+1)$ (D) $\frac{N(N-1)}{2}$
14. The DFT of the sequence $x(n) = \delta(n-n_0)$ is
 (A) 1 (B) $e^{j2\pi Kn_0}$
 (C) $e^{-j2\pi n_0 K/N}$ (D) $e^{j2\pi n_0 K/N}$
15. The number of complex multiplications involved in the computation of 8-point DFT is
 (A) 8 (B) 16
 (C) 32 (D) 64
16. The function which has its Fourier transform Laplace transform and Z-transform as unity is
 (A) Gaussian (B) Impulse
 (C) Sinc (D) Rectangular
17. The region of convergence of Z-transform of the sequence $a^n u(n)$ is
 (A) $|z| > a$ (B) $|z| < a$
 (C) $|z| < \frac{1}{a}$ (D) $|z| > \frac{1}{a}$
18. The Z-transform $f(z)$ of the function $f(nT) = a^{nT}$ is
 (A) $\frac{z}{z-a^T}$ (B) $\frac{z}{z+a^T}$
 (C) $\frac{z}{z-a^{-T}}$ (D) $\frac{z}{z+a^{-T}}$

19. Which one of the following represents the impulse response of a system defined by $H(z) = z^{-m}$
 (A) $u(n-m)$ (B) $\delta(n-m)$
 (C) $\delta(m)$ (D) $\delta(m-n)$
20. The z-transform of a system is $H(z) = \frac{z}{z-0.2}$. If the ROC is $|z| < 0.2$, then the impulse response of the system is
 (A) $(0.2)^n u(n)$ (B) $(0.2)^n u(-n-1)$
 (C) $-(0.2)^n u(n)$ (D) $-(0.2)^n u(-n-1)$

PART - B (5 × 4 = 20 Marks)
 Answer ANY FIVE Questions

21. For the given signal $x(n) = \{1, 2, -1, 2\}$, sketch
 (i) $x(n-4)$
 (ii) $x(n+2)$
 (iii) $x(2n+3)$
 (iv) $x(3-n)$
22. Find the Laplace transform of $x(t) = \sin \omega_0 t u(t)$.
23. Find the inverse Fourier transform of $X(j\omega) = \frac{j\omega}{(4+j\omega)^2}$.
24. Find the even and odd components of $x(t) = \cos t + \sin t$.
25. Compute $X(z)$ and determine the region of convergence of the sequence $x(n) = u(n) - u(n-2)$.
26. Compute the discrete time Fourier transform of
 (i) $x(n) = u(n)$
 (ii) $x(n) = \delta(n)$
27. Test the continuous time system for stability $h(t) = te^{at}u(t)$.

PART - C (5 × 12 = 60 Marks)
 Answer ALL Questions

28. a.i. Find the even and odd components of the signal $x(t) = \cos t + \sin t + \cos t \sin t$.
 ii. Check whether the given signal is energy or power signal $x(t) = r(t) - r(t-2)$.
- (OR)
- b. Check whether the following systems are
 (i) Static or dynamic
 (ii) Linear or non linear
 (iii) Causal or non casual
 (iv) Time invariant or time variant