Total No. of Questions : 8]   *[Total No. of Printed Pages : 3*

Roll No ....

EE/EX-3005-CBGS
B.E., III Semester
Examination, December 2020
Choice Based Grading System (CBGS)
Signals and Systems
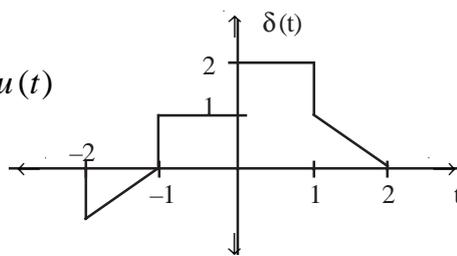*Time : Three Hours*

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

iii) Sketch neat diagram.

1. a) Write short notes on followings:
    i) Periodic and non-periodic signals
    ii) Power and energy signals
    iii) Discrete time impulse function $\delta(n)$

    b) A continuous time signal given below. Sketch the following signals.

    i) $\delta\left[4-\left(t/2\right)\right]$

    ii) $\left[\delta(t)+\delta(-t)\right]u(t)$

    iii) $\delta(2t+1)$

2. a) Discuss the determination of the Fourier series representation of continuous time periodic signals.

    b) Determine the fundamental frequency ω_0 and continuous-time Fourier series coefficient A_K for the signal.

$$\delta(t)=2+\cos\left(\frac{2\pi}{3}t\right)+4\sin\left(\frac{5\pi}{3}t\right)$$

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3. a) List and explain various properties of Fourier transform.

   b) What do you understand by region of convergence (ROC)? Explain with example.

4. a) Find Fourier transform of
      i) $t \cos at$
      ii) $sgn\ (t)$

   b) Calculate the Laplace transform of the following.
      i) $t \sin at$
      ii) te^{-2t}
      iii) t^n

5. a) State and prove time shifting and differentiation in the Z-domain property of Z-transform.

   b) Determine the causal signal $x(n)$ whose Z-transform is given by

      i) $x(z) = \dfrac{1 + z^{-1}}{1 - z^{-1} + 0.5z^{-2}}$

      ii) $x(z) = \dfrac{1}{\left(1 + z^{-1}\right)\left(1 - z^{-1}\right)^2}$

6. a) Determine the response of the system

      $y(n) = \dfrac{5}{6} y(n-1) - \dfrac{1}{6} y(n-2) + x(n)$

      to the input signal $x(n) = \delta(n) - \dfrac{1}{3}\delta(n-1)$

   b) State and prove convolution property of Z-transform.

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7. a) If the unit step response of a system starting from rest is given by $s(t) = 3(1 - e^{-st}), t \geq 0$. Then find the transfer function of the system.

b) If $x(n)\{1, 5, -2, 1, \underset{\uparrow}{3}, 4, 2, 0, 5\}$ then find DTFT $\left[x(e^{j\omega}) \right]$.

8. Write short notes on the following.
   i) Classification of continuous and discrete time signals
   ii) Linear time invariant systems and properties
   iii) Fourier series analysis

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