*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.

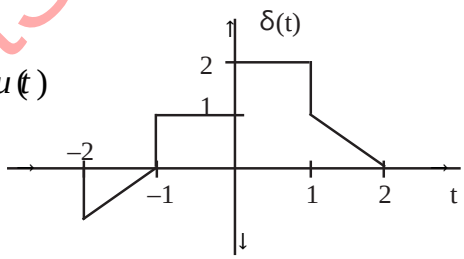
1. a) Write short notes on followings:
   i) Periodic and non-periodic signals
   ii) Power and energy signals
   iii) Discrete time impulse function $\delta(n)$

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

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

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

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




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

   b) Determine the fundamental frequency $\omega_0$ and continuous-time Fourier series coefficient $A_K$ for the signal.

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

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

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

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

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

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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