Total No. of Questions : 4]

SEAT No. :

P5038

[Total No. of Pages : 2

[6187]-438
T.E. (Electrical Engineering) (Insem)
DIGITAL SIGNAL PROCESSING
(2019 Pattern) (Semester - I) (303145 B) (Elective - I)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Explain the analog-to-digital conversion process. **[5]**

b) Find the linear convolution of the following signals. **[10]**

i) $x(n)=\{2,5,\underset{\uparrow}{-3},-2\}$ and $h(n)=\delta(n-2)+2\delta(n)-3\delta(n-1)$

ii) $x(n)=\left(\frac{1}{2}\right)^n u(n)$ and $h(n)=\left(\frac{1}{5}\right)^n u(n)$

OR

Q2) a) Define following terms **[5]**

i) Linear and nonlinear system

ii) Static and dynamic system

b) Let $x(t)$ be the sum of sinusoidal signals **[10]**

$$x(t)=6\cos(50\pi t)+20\sin(300\pi t)-10\cos(100\pi t)$$

where t is in milliseconds. Determine the minimum sampling rate that will not cause any aliasing effects, that is, the Nyquist rate. To observe such aliasing effects, suppose this signal is sampled at (2/3)rd of its Nyquist rate. Determine the signal $xa(t)$ that would be aliased with $x(t)$.

P.T.O.

Q3) a) Explain stability of the system using z-Transform. **[5]**

b) Find the z-transform of the following signals with ROC **[10]**

i) $x(n)=\{2,-3,\underset{\uparrow}{4},0,1\}$

ii) $x(n)=\left(\frac{1}{2}\right)^n u(n)+\left(\frac{2}{3}\right)^n u(-n-1)$

OR

Q4) a) State and prove time reversal property of z-transform. **[5]**

b) Find the system function and impulse response of the system described by the difference equation **[10]**

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

State whether the system is stable or not?