

**GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-V<sup>th</sup> Examination December 2010**Subject code: 150303****Subject Name: Signals & systems****Date: 16 /12 /2010****Time: 03.00 pm - 05.30 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Define signal & explain its classification with diagrams. **07**  
 (b) Explain any seven properties of Z-transform in brief. **07**
- Q.2** (a)  $X(n) = \{2, 3, -1, 4\}$  **07**  
 plot : (i)  $x(n+3)$   
 (ii)  $x(-n-2)$   
 (iii)  $x(n+1) \cdot u(-n+1)$   
 (b) Give the classification of system. **07**
- OR**
- (b) (i) Determine zero-input response of  $(D^2+4D+40)y(t)=(D+2)x(t)$  with initial **07**  
 condition  $y_0(0)=2$  &  $dy_0(0)/dt=16.78$ .  
 (ii) solve:  $(D^2+2D)y_0(t)=0$ . If  $y_0(0)=1$  &  $dy_0(0)/dt=4$ .
- Q.3** (a) Explain the significance of  $h(t)$  and determine unit impulse response of **07**  
 $(D+2)y(t)=(3D+5)x(t)$ .  
 (b) Define convolution integral and discuss its properties. **07**
- OR**
- Q.3** (a) Define even and odd function. Discuss their properties and explain how **07**  
 every signal  $x(t)$  can be expressed as a sum of even and odd component.  
 (b) Explain sampling theorem with proof. **07**
- Q.4** (a) Write down the advantages of digital signal processing. **07**  
 (b)  $Y[n+2]-0.6y[n+1]-0.16y[n]=5x[n+2]$ . Find the total response if initial **07**  
 condition  $y[-1]=0$ ,  $y[-2]=25/4$  &  
 $x[n] = 4^{-n}u[n]$ .
- OR**
- Q.4** (a) Find the Z-transform: (i)  $\sin\beta nu(n)$  **07**  
 (ii)  $-\alpha^n u(-n-1)$
- Q.4** (b) Describe the properties of DFT. **07**
- Q.5** (a) Explain Bilateral Z-transform. **07**  
 (b) Find inverse Z-transform. **07**  
 (i)  $X(z)=(1-1/2Z^{-1})/(1+3/4 Z^{-1}+1/8Z^{-2})$   
 (ii)  $X(z)=10z/(z-1)(z-2)$
- OR**
- Q.5** (a) Determine the system response. **07**  
 (i)  $x(t)=10e^{-3t}u(t)$  and  $h(t)=(2e^{-2t} - e^{-t})u(t)$   
 (ii)  $x(t)=2u(t)$  &  $h(t)=6 \cdot e^{-t}u(t)$   
 (b) Write a short note on AM and FM. **07**