

**Mid-Semester Examination, B.Tech IT 5<sup>th</sup> Semester 2023**  
**Digital Signal Processing**  
**Answer All Questions**

1. (a) What is system? Discuss about the different types of systems.  
(b) Prove whether  $x(t) = \cos^2(2t - (\pi/3))$  is periodic or not.

8+2=10

2. Define convolution? Find the output  $y[n]$  of an LTI System whose impulse response  
i.  $h[n] = \{ \underset{\uparrow}{3} \underset{\uparrow}{2} \underset{\uparrow}{1} \}$  and input signal  $x[n] = \{ \underset{\uparrow}{3} \underset{\uparrow}{1} \underset{\uparrow}{2} \}$   
ii.  $h[n] = a^n u[n], |a| < 1, x[n] = u[n]$

2+5+3=10

3. What do you understand by discrete Fourier transform? Explain in brief the properties of DFT.

3+7=10

*OR*

DFS