B.E. Electronics & Communication/Telecommunication Engineering (Model Curriculum)
Semester-V

ET505M - Digital Signal Processing

P. Pages : 2 **GUG/W/23/13926**

Time : Three Hours * 7 5 1 3 * Max. Marks : 80

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1. a) Find the Discrete Fourier transform of a sequence of x(n) = {1, 1, 0, 0}. **8**

b) Find the circular convolution of two finite duration sequence of sequence **8**
$x_1(n) = \{2, 1, 2, 1\}$; and
$x_2(n) = \{1, 2, 3, 4\}$

OR

2. a) What do you understand by the terms: signal and signal processing? Discuss in details the Block diagram of Digital signal processing. **8**

b) Determine the 08-Point DFT of the sequence **8**
x(n) = {1, 1, 1, 1, 1, 1, 0, 0}.

3. a) Define the z-transform, Discuss in details the concept of Region of convergence along with suitable example. **8**

b) Find the z-transform of the sequence **8**
$x(n) = \{2, -1, 3, 2, \underset{\uparrow}{1}, 0, 2, 3, -1\}$

OR

4. a) Find the inverse z transform of **8**

$$x(z) = \frac{z^2 + z}{(z-1)(z-3)}, \text{ Roc} = |z| > 3$$

By using Partial Fraction method.

b) What are the different Methods of evaluating inverse z-transform? Explain any one in details. **8**

5. a) Give direct form I and direct form II structure of second order system realization. **8**

b) Discuss in details the warping effect and pre warping effect. **8**

OR

6. a) Determine the direct form II realization for the following system **8**

$$y(n) = -0.1y(n-1) + 0.72y(n-2) + 0.7x(n) - 0.25x(n-2)$$

b) Determine the order and the poles of low pass Butterworth filter that has 3dB attenuation at 500Hz and an attenuation of 40dB at 100Hz. **8**

7. a) For the analog transfer function **8**

$$H(s) = \frac{2}{(s+1)(s+2)}$$

Determine H(z) using impulse invariance method. Assume T=1 sec.

b) What is Bilinear transformation? What are the properties of the Bilinear transformation? Explain with suitable example. **8**

OR

8. a) An analog filter has a transfer function $H(s) = \frac{1}{s^2 + 6s + 9}$ **8**

Design a digital filter using Bilinear transformation method.

b) How one can design digital filters from analog filters? Justify in your own words along with suitable example. **8**

9. a) Describe in details the concept of Quadrature Mirror Filter (QMF) Bank. **8**

b) What is Multirate signal processing? Elaborate along with suitable example. **8**

OR

10. a) Illustrate the concept of Implementation of digital filter Bank. **8**

b) What is the need for anti-imaging filter after up-sampling a signal? Explain along with suitable example. **8**

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