

B.E. / B.Tech. (Electronics & Communication / Telecommunication Engineering) Model
Curriculum Semester-V
ET505M - Digital Signal Processing

P. Pages : 2

Time : Three Hours



GUG/W/24/13926

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Discuss in details the following operations performed on discrete time signals along with suitable example. 8
- i) Shifting ii) Time scaling
- iii) Signal multiplier iv) Time reversal
- b) Determine the values of Power and Energy of the following signals. 8
- i) $x(n) = (1/3)^n u(n)$.
- ii) $x(n) = e^{j\left(\frac{\pi}{2}n + \frac{\pi}{4}\right)}$

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) Find the Discrete Fourier transform of a sequence of $x(n) = \{1, 1, 0, 0\}$ 8
3. a) What is z-transform? Discuss in details the properties of z-transform along with suitable example. 8
- b) Find the inverse Z-transform of 8
- $$x(z) = \frac{z^2 + z}{(z-1)(z-3)}; \text{Roc} = |z| > 3$$

OR

4. a) Find the z-transform of ROC of $x(n) = a^n u(n)$ 8
- b) Find the Inverse z-transform of 8
- $$x(z) = \frac{1}{1 - 1.5z^{-1} + 0.5z^{-2}}; \text{ROC} : |z| > 1$$
- by using Power series expansion method.

5. a) Derive the expression for rounding and truncation errors. 8
- b) What are the different types of structures of realization of IIR systems? Explain any one in details. 8

OR

6. a) Discuss in details the warping effect and pre warping effect. 8
- b) Determine the direct form II realization of the following system. 8
- $$y(n) = -0.1y(n-1) + 0.72y(n-2) + 0.7x(n) - 0.25x(n-2)$$
7. a) How one can design digital filters from analog filters? Justify in your own words along with suitable example. 8

- b) 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.

OR

8. a) An analog filter has a transfer function 8
- $$H(s) = \frac{1}{s^2 + 6s + 9}$$
- Design a digital filter using Bilinear transformation method.

- b) Discuss in details finite word length effects in digital filter. 8

9. a) What is Multirate signal processing? Discuss along with suitable example. 8
- b) Elaborate the concept of Decimation by Factor D. 8

OR

10. a) Illustrate the concept of Interpolation by factor. 8
- b) What is the need for anti-aliasing filter prior to down sampling? Explain along with suitable example. 8
