

M.Sc. S.Y. (Electronics) (CBCS Pattern) Sem-III  
**PSELT303.1 - Paper-III - DSE-I : Digital Signal Processing**

P. Pages : 2

GUG/W/22/11255

Time : Three Hours



Max. Marks : 80

- Notes :
1. All questions are compulsory and carry equal marks.
  2. Draw neat and labelled diagrams wherever necessary
  3. Use of log table and calculator is allowed.

**Either**

1. a) What are the different types of systems used in signal processing? Explain any three with suitable examples. 8
- b) Sketch a discrete time signal  $x(n) = 2^{-n}$  for  $-2 \leq n \leq 2$  and obtain: 8
- i)  $y_1(n) = 2x(n) + \delta(n)$
  - ii)  $y_2(n) = x(n) \cdot u(2-n)$

**OR**

- c) Define: 8
- i) Time variant / time invariant
  - ii) Linear / Non linear
- d) Discuss any four properties of discrete time sinusoidal signal. 8

**Either**

2. a) Find the z-transform of all test signals. 8
- b) Discuss the properties of Region of convergence (ROC). 8

**OR**

- c) Find the z-transform of : 8
- i)  $n a^n u(n)$
  - ii)  $n^2 + 2n + 3 \quad n \geq 0$
- d) Using partial fraction expansion method find the inverse z-Transform of give  $x[z]$  8
- $$x[z] = \frac{1}{\left[1 - z^{-1}\right] \left[1 - \frac{1}{2} z^{-1}\right]^3}$$

**Either**

3. a) What are the different steps involved in designing of a digital filter? Draw the block diagram of digital filter. 8

- b) Design the digital filter using impulse invariance method for the  $H(s)$ : 8

$$H[s] = \frac{(s+2)}{(s+1)(s+3)}$$

**OR**

- c) Name different windowing techniques. Explain kaiser window filter design method 8
- d) Design a low pass digital filter with cut off frequency  $W_c = \pi/2$  using the frequency sampling technique for  $N=17$  8

**Either**

4. a) Draw a block diagram of general purpose DSP Processor and explain function of each blocks. 8
- b) Explain: 8
- i) Flanging Effect and
- ii) Chorus effect introduced in music.

**OR**

- c) Describe with a block diagram the salient features of the Motorola DSP – 5600 Processor. 8
- d) Explain echo-effect introduced in music 8
5. a) Explain the folding shifting and Shifting folding operations in a signal with Suitable examples. 4
- b) Plot the pole zero diagram of the following system: 4
- $$H(z) = \frac{1 + 1.5z^{-1} + 0.6z^{-2}}{1 - z^{-1} + 0.5z^{-2}}$$
- c) Differentiate between FIR and IIR filters. 4
- d) Compare the DSP Processors and general purpose processors. 4

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