6th SEM. / AE & IE /EEE /ETC/2022(S)

ETT 603 Digital Signal Processing

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
   a. Write any two applications of Digital Signal Processing.
   b. State Sampling theorem.
   c. Define an LTI System.
   d. Draw the continuous and discrete signum function.
   e. Define a causal signal and causal system.
   f. Give one example of the following type of signals.
      (i) Finite Duration Signal (ii)Infinite Duration signal
   g. Define ROC.
   h. List any two types of digital filters.
   i. Mention the advantage of FFT algorithm over DFT algorithm.
   j. Define FIR and IIR system

2. Answer **Any Six** Questions 6 x 5
   a. Write the advantage of digital signal processing over analog signal processing.
   b. Show the graphical representation of the signals, x(n-2), x(n+3), x(-n-2), and x(-n+3) where x(n) is given as below.

      $\mathbf{x(n) = \{1, \underset{\uparrow}{2}, 1, 2, 1\}}$

   c. Compute poles, zeros and system response of the following:
      y(n) = 2 y(n - 1) + 3x(n)
   d. State any 5 properties of z-transform.
   e. What are the different types of signal representation? Explain with examples
   f. Define Linear Convolution. State its properties.
   g Find the DFT of the sequence x(n) = {1, 1, 0, 0}

3 Express the causal signal x(n) = {**1**, -2, 3, 0, 1, -5, 1, 2} in even and odd signal. 10

4 (i) Determine the linearity of the system described by the input output equation as 10

$$\mathbf{y(n) = x(n^2)} \quad [5]$$

(ii) Differentiate between continuous valued and digital signals [5]

5 Determine the impulse response of the causal system, 10

y(n) + y(n-1) + 2y(n-2) = x(n-1) + 2x(n-2)

6 State the difference between analog filter and digital filter. 10

7 Determine the DFT of the sequence **x(n) = {1, 2, 1, 1, 0, 1, 1, 1}** using DIT-FFT by radix-2 algorithm. 10

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