Total No. of Questions : 8] *[Total No. of Printed Pages : 3*

Roll No ....

IT-6005(1)-CBGS

B.E. VI Semester

Examination, June 2020

Choice Based Grading System (CBGS)

Digital Signal and Processing

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.

1. a) Differentiate continuous time and discrete time systems. Determine whether the following systems are causal or non-causal
   i) $y(t) = x(-t)$
   ii) $\dfrac{dy(t)}{dt} + 10y(t) + 5 = x(t)$

   b) Write and explain any four properties of Linear-time invariant systems.

2. a) What is Z-transform? Write and explain time shifting and time reversal property of Z-transform.
   b) Determine the Z-transform of the sequence given below:

$$x(n)\left|\begin{array}{lll} 2^n & \text{for} & n<0 \\ \left(\dfrac{1}{2}\right)^n & \text{for} & n=0,2,4 \\ \left(\dfrac{1}{3}\right)^n & \text{for} & n=1,3,5 \end{array}\right.$$

3. a) Define inverse z-transform. Find inverse z-transform of

$$\frac{1}{1-4z^{-1}}$$

   b) Determine the z-transform and ROC of the signal

$$x(n) = \left(\frac{4}{1}\right)^n u(n)$$

4. a) What do you mean by convolution sum? Write the steps involved in finding out the convolution sum of given signal.

   b) Determine the convolution of two finite duration sequences given below:

$$x(n) = \begin{cases} 1 & \text{for} \quad -1 \le n \le +1 \\ 0 & \quad \text{otherwise} \end{cases}$$

$$h(n) = \begin{cases} 1 & \text{for} \quad -1 \le n \le +1 \\ 0 & \quad \text{otherwise} \end{cases}$$

5. a) What is Discrete Fourier Transform? Find the Discrete Fourier Transform (DFT) of the sequence

   $x(n) = \{1, 1, 0, 0\}$ and find the IDFT of

   $y(k) = \{1, 0, 1, 0\}$

   b) Write any four properties of discrete Fourier transform.

6. a) What is Fast Fourier Transform? How it differs from DFT.

   b) Given $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$ find X(k) using DIT FFT algorithm.

7. a) Give a comparative study of IIR and FIR filters.
   b) With the help of suitable diagrams explain the window technique for designing of FIR filters.

8. Write short notes on any two of the followings:
   i) Hamming Window Function
   ii) Two dimensional DFT
   iii) Signal flow graph representation
   iv) Stability and Causality

******