B.E. SEM VI / INST / CBGS / MAY 2017

QP Code : 13491

(3 Hours) **[Total Marks : 80**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attemt any **three** questions out of remaining **five** questions.
(3) Assume **suitable** data if **necessary**.

1. Answer the following any **four** :– **20**
   (a) Compare FIR and IIT filter
   (b) Determine the inverse DFT by using DIFFFT
   x[k] = {15 -5+4j 3 -5-4j}
   (c) Draw and explain block diagram of DSP processor
   (d) Compare the Impulse Invarianc and Bilinear Transformations
   (e) State and prove the circular time shift property of DFT.

2. (a) Perform circular convolution using DFT/IDFT **10**
   x(n) = {3 5 1 2} h(n) = {7 1 8 2}
   (b) Determine linear convolution using overlap save method **10**
   x(n) = {2 -1 3 1 -2 4 1 -3 -1 2 5 3}
   h(n) = {7 4 6}

3. (a) Explain Multirate signal processing. **10**
   (b) Find 8 point DFT of the given sequence using DIFFFT **10**
   x(n) = {3 1 6 2 1 5 8 4}

4. (a) For the following transfer function Draw Direct Form-I, Direct Form II, cascade and parallel realization $H(z) = \frac{(z-0.2)(z-0.4)}{(z-0.1)(z-0.7)}$ **10**
   (b) A low pass filter has the following specifications **10**

$$0.8 \le \left|H\left(e^{jw}\right)\right| \le 1 \quad 0 \le w \le 0.2\pi$$

$$\left|H\left(e^{jw}\right)\right| \le 0.2 \quad 0.7\pi \le w \le \pi$$

find Filter order and cutoff frequency
   (i) by BLT method
   (ii) by IIT method used for design

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5. (a) A low pass filter is to be designed with the following desired frequency response. **10**

$$H_d\left(e^{jw}\right) = e^{-j3w} \quad , \quad -\pi/4 \le w \le \pi/4$$

$$= 0 \quad , \quad \pi/4 \le |w| < \pi$$

Determine the filter coefficients h(n), if the window used is hamming window.

(b) If x(n) = {7 5 9 2} find **10**

(i) DFT of x(n)

(ii) Using result obtained in (i) and not otherwise find the DFT of the following sequences

1. x(n-1)
2. x(n-3)
3. x(-n)
4. $x_1(n)$ = {7 -5 9 -2}

6. (a) Frequency response of a filter is given by an expression **5**
h (e^{jw}) = e^{-j3w} [2+1.6 cos 3w+1.4cos2w+0.6cosw] find impulse response h(n) of the filter.

(b) The transfer function of analog filter is $h(s) = \frac{1}{(s+1)(s+3)}$ **5**

Find H(z) using Impulse Invariance method.

(c) Derive the DITFFT algorithm for N = 6 = 3.2 **10**
