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

QP Code: 13491

(3 Hours)

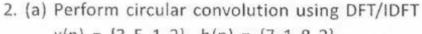
[Total Marks: 80

N.B.: (1) Question No. 1 is compulsory.

- (2) Attemt any three questions out of remaining five questions.
- (3) Assume suitable data if necessary.



- (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.



 $x(n) = \{3 \ 5 \ 1 \ 2\}$ $h(n) = \{7 \ 1 \ 8 \ 2\}$

(b) Determine linear convolution using overlap save method

$$x(n) = \{2 -1 \ 3 \ 1 -2 \ 4 \ 1 -3 -1 \ 2 \ 5 \ 3\}$$

 $h(n) = \{7 \ 4 \ 6\}$

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



(b) A low pass filter has the following specifications

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

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

find Filter order and cutoff frequency

- (i) by BLT method
- (ii) by IIT method used for design



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TURNOVER

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

$$H_{d}\left(e^{jw}\right) = e^{-j3w} \quad , \quad -\frac{\pi}{4} \le w \le \frac{\pi}{4}$$
$$= 0 \quad , \quad \frac{\pi}{4} \le |w| < \pi$$

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

(b) If $x(n) = \{7 \ 5 \ 9 \ 2\}$ find

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- (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 $h\left(e^{jw}\right) = e^{-j3w}\left[2+1.6\cos 3w+1.4\cos 2w+0.6\cos w\right] \text{ find impulse response h(n) of the filter.}$
 - (b) The transfer function of analog filter is $h(s) = \frac{1}{(s+1)(s+3)}$

Find H(z) using Impulse Invariance method.

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

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