B.E.(with Credits)-Regular-Semester 2012-Electronics Engineering Sem VII

EN - Digital Signal Processing

P. Pages : 2 **GUG/W/16/6594**

Time : Three Hours * 4 6 8 1 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. Due credit will be given to neatness and adequate dimensions.
3. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) State & prove circular shifting properly of DFT. **6**

b) State & prove circular convolution properly of DFT. **6**

c) Compare DFT & FFT. **4**

OR

2. Draw complete signal flow diagram for 16 point DFT using DIT FFT algorithm. **16**

3. Realize the following. **16**

$y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$

By using DF-I, DF-II, cascade & parallel form.

OR

4. a) Realize following FIR filter using minimum number of multiplier. **8**

$H(z) = \frac{1}{2} + \frac{1}{3}z^{-1} + z^{-2} + \frac{1}{4}z^{-3} + z^{-4} + \frac{1}{3}z^{-5} + \frac{1}{2}z^{-6}$.

b) Consider an FIR lattice filter with coeff. $K_1 = \frac{1}{2}$, $K_2 = 1/3$, $K_3 = 1/4$. **8**

Determine FIR filter coeff. from DF structure.

5. a) Compare IIR & FIR filter. **8**

b) Design a FIR bandstop filter using rectangular window whose desired frequency response **8**

$Hd(\omega) = e^{-j\omega\tau}$ & N=7 given cutt-off freq. are $\omega c_1 = 1$ rad/sec & $\omega c_2 = 2$ rad/sec.

OR

6. Design an FIR filter using kaiser window to make the following specification. **16**

$0.99 \le H(e^{j\omega}) \le 1.01 \quad ; \ 0 \le \omega \le 0.19\pi$

$|H(e^{j\omega})| \le 0.01 \quad ; \ 0.21\pi \le \omega \le \pi$

7. a) Compare impulse invariance & bilinear transformation method. **8**

b) Convert the analog filter with the system function into a digital IIR filter by means of an impulse invariance method **8**

$$Ha(s) = \frac{s + 0.1}{(s + 0.1)^2 + 9}.$$

OR

8. Design Chebyshev analog filter with maximum PB attenuation of 2.5 dB at r_p = 20 rad/s & SB attenuation of 30 dB at r_s = 50 rad/s. **16**

9. a) Explain interpolation by a factor I in brief. **8**

b) Consider a discrete time signal $x(n) = \left\{\underset{\uparrow}{1}, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\right\}$. **8**

Determine the down sampling version of sampling rate reduction factor.

a) D = 2 b) D = 3 D = 4.

OR

10. Write a short note on. **16**

a) Subband coding.

b) Digital filter bank.

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