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Code No: EC1533

GEC-R14

III B. Tech II Semester Regular Examinations, April 2017

**DIGITAL SIGNAL PROCESSING**  
(Electronics and Communication Engineering)

Time: 3 Hours

Max. Marks: 60

**Note:** All Questions from **PART-A** are to be answered at one place.

Answer any **FOUR** questions from **PART-B**. All Questions carry equal Marks.

**PART-A**

**6 × 2 = 12M**

1. Determine whether the system  $y(n) = x(n) + x(n-2)$  is causal or not.
2. Give the expressions for Auto correlation of  $x(n)$  and Cross Correlation of  $x_1(n)$  and  $x_2(n)$ .
3. If DFT of  $x[n]$  is  $X[k] = [4, -j2, 0, j2]$  the DFT of  $x^*(n)$  is \_\_\_\_\_
4. In an 8-point DFT by radix-2 FFT, there are \_\_\_\_\_ stages of computation with \_\_\_\_\_ butterflies per stage.
5. a) The transition band is more in  
A) Butterworth Filter                      B) Chebyshev type - 1  
C) Chebyshev type - 2                      D) FIR Filter  
b) The poles of Butterworth filter lies on  
A) Sphere    B) Circle    C) Ellipse    D) Parabola
6. What are the different types of filters based on frequency response?

**PART-B**

**4 × 12 = 48M**

1. a) Determine whether the following systems are static or Dynamic and Explain why. (6M)  
i)  $y(n) = x(n+2)$     ii)  $y(n) = x^2(n)$     iii)  $y(n) = x(n-2) + x(n)$   
b) Explain Time shifting, Time Scaling and Amplitude Scaling Operations. (6M)
2. a) Determine the magnitude and phase response of the system. (6M)  
 $y[n] - 5y[n-1] = x[n] + 4x[n-1]$   
b) Derive the expression for output of LTI System whose input is  $x(n)$  and impulse response is  $h(n)$ . (6M)
3. a) Compare Linear and Circular convolution. (6M)  
b) Find 6 pt. DFT of the sequence  $x(n) = \{1, 1, 2, 2, 3, 3\}$  (6M)

4. a) Draw the 8-Point DIT FFT diagram. (6M)
- b) Explain how you can find Inverse DFT using FFT algorithm. (6M)
5. a) Find the order of analog low pass Butterworth filter that has -2 dB pass band attenuation at a frequency of 20 rad/s and atleast -10 dB stopband attenuation at 30 rad/s. (6M)
- b) Explain the procedure for designing analog low pass Chebyshev filter. (6M)
6. a) Explain any three windows that can be used for designing of FIR Filters. (6M)
- b) Explain any two realization methods of IIR Filter. (6M)

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