

M.Tech. Electronics & Communication Engineering (CBCS Pattern) Sem-I  
**PECS13 - Advanced Digital Signal Processing**

P. Pages : 2

Time : Three Hours



**GUG/W/22/10980**

Max. Marks : 70

- Notes :
1. All questions carry marks as indicated.
  2. Answer **five** questions from eight questions.
  3. Assume suitable data wherever necessary.
  4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Compute the IDFT of the sequence **8**  
 $X(K) = \{7, 0.707 - j0.707, -j, 0.707 - j0.707, 1, 0.707 + j0.707, j, -0.707 + j0.707\}$   
Using DIT - FFT algorithm
- b) List the three well known methods of designing techniques for FIR filter and explain any one. **6**
2. a) Perform the circular evaluation of the following sequences using DFT and IDFT. **10**  
 $x_1(n) = \{1, 2, 1, 2\}$  and  $x_2(n) = \{4, 3, 2, 1\}$
- b) State all properties of DFT. **4**
3. a) Explain method of constructing Butterworth circle in the  $z$  - plane using the bilinear transformation method. **7**
- b) Design a linear phase FIR band pass filter to pass frequencies in the range  $0.4\pi$  to  $0.65\pi$  rad / sample by taking 9 samples of hanning window. **7**
4. a) Explain detail the LMS algorithm for direct FIR filters. **6**
- b) The specification of the desire low pass filter is **8**  
$$\frac{1}{\sqrt{2}} \leq |H(w)| \leq 1.0; 0 \leq w \leq 0.2\pi$$
$$|H(w)| \leq 0.08; 0.4\pi \leq w \leq \pi$$
  
Design a Butterworth digital filter using the Bilinear transformation.
5. a) State the features of TM5320C5X DSP processor. Explain pipeline and parallel processing in DSP processor. **7**
- b) What is adaptive filter? With neat block diagram discuss any four application of adaptive filter. **7**
6. a) Obtain the lattice coefficient and direct form realization of FIR system with system function.  $H(z) = 1 + \frac{5}{12}z^{-1} + \frac{2}{3}z^{-2}$  and realize it. **7**
- b) Discuss in detail various finite word length effects in digital filters. **7**

7. a) Define the following terms. 7
- i) Forward prediction error.
- ii) Backward prediction error.
- b) Realize the following IIR system in cascade and parallel form 7
- $$y(n) + \frac{1}{4}y(n-1) - \frac{1}{8}y(n-2) = x(n) - 2x(n-1) + x(n-2)$$
8. a) Explain the AR, MA model in detail. 7
- b) Explain how the parametric methods overcome the limitations of the non - parametric methods. 7

\*\*\*\*\*