

Seat No.	
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**T.E. (Electronics & Telecommunication) (Semester - VI)**  
**(Revised) Examination, November - 2017**  
**DIGITAL SIGNAL PROCESSING**  
**Sub. Code: 66916**

Day and Date : Wednesday, 01 - 11 - 2017  
 Time : 2.30 p.m. to 5.30 p.m.

Total Marks : 100

- Instructions :
- 1) All Questions are compulsory.
  - 2) Figures to right indicates full marks.
  - 3) Assume suitable data if required.

**Q1) Attempt any Two:**

[18]

- a) Explain the concept of convergence of Fourier transform and Gibb's phenomenon.
- b) What is DTFT. Explain symmetrical properties of DTFT.
- c) What is twiddle factor? Compute the DFT of 4-point sequence,  $x(n) = (0, 1, 2, 3)$

**Q2) Attempt any Two:**

[16]

- a) Find  $y(n) = x(n) * h(n)$  for sequence  $x(n) = (1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 1, 2, -1)$  and  $h(n) = (1, 2)$  using overlap add method.
- b) Explain Goertzel FFT algorithm.
- c) For  $x_1(n)$ ,  $x_2(n)$  given, compute Circular Convolution.  
 $x_1(n) = (2, 1, 2, 1)$ ,  $x_2(n) = (1, 2, 3, 4)$

Q3) Attempt any **Two**:

- Describe frequency sampling method for FIR filter design.
- Determine coefficients of linear phase FIR filter of length  $M=15$  which has a symmetric unit sample response and a frequency response that satisfies the condition, use frequency sampling method.

$$H_r(2\pi k/15) = 1 \quad k = 0, 1, 2, 3$$

$$= 0.4 \quad k = 4$$

$$= 0 \quad k = 5, 6, 7$$

- Explain windowing technique used in FIR filter design. Give any two window functions.

Q4) Attempt any **Two**:

[18]

- For the analog transfer function  $H(s) = 1/(s+1)(s+2)$ , Determine  $H(z)$  using impulse invariant technique. Assume  $T = 1$  sec.
- Explain BLT method of IIR filter design.
- Design digital low pass filter using Butterworth approximation to meet following specifications:

$$\text{Pass band edge} = 120 \text{ Hz}$$

$$\text{Stop band edge} = 170 \text{ Hz}$$

$$\text{Stop band attenuation} = 16 \text{ dB}$$

Assume sampling frequency of 512 Hz.

Q5) Attempt any **Two**:

[16]

- Explain the cascade form realization of FIR filter.
- State realizations of IIR filter. Explain any one in detail.
- Explain Direct form realization of FIR filter and obtain Direct form realization of system function given:

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

Q6) Attempt any Two:

- a) Compare microprocessor and DSP processor.
- b) Explain different architectures of DSP's.
- c) Explain specifications of any DSP processor.

