

Seat No.	
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**T.E.(Electronics & Telecomm. Engg.) (Part-II) (Semester - VI)**

**Examination, December-2015**

**DIGITAL SIGNAL PROCESSING**

**Sub. Code : 45692**

**Day and Date: Tuesday, 01-12-2015**

**Time : 02.30 p.m. to 05.30 p.m.**

**Total Marks : 100**

- Instructions :**
- 1) All questions are compulsory.
  - 2) Figures to the right indicate full marks.
  - 3) Assume suitable data if necessary.

**SECTION-I**

**Q1) Attempt any two: [2 × 9 = 18]**

- a) By using DFT & IDFT find the response of FIR filter for the given sequences.  
 $x(n) = \{2, 1\}$  and  $h(n) = \{1, 2\}$ .
- b) What is sectioned convolution? Explain in detail overlap save method.
- c) Find the DFT of the given sequence  $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$  using DIT-FFT algorithm.

**Q2) Attempt any two: [2 × 8 = 16]**

- a) Using frequency sampling method, design a bandpass filter with the given specifications.

Sampling frequency :  $F = 8000 \text{ Hz}$

cut-off frequencies :  $F_{c1} = 1000 \text{ Hz}$

$F_{c2} = 3000 \text{ Hz}$

Determine the filter coefficients for  $N = 7$ .

**P.T.O.**

- b) Explain Gibbs phenomenon. Explain windowing method of filter design.
- c) Using fourier series method design an ideal high pass filter with frequency response:  $H_d(e^{jw}) = 1$  for  $\frac{\pi}{4} \leq |w| \leq \pi$

$$= 0 \text{ for } |w| \leq \frac{\pi}{4}$$

Find the values of  $h(n)$  for  $N = 11$  & Find  $H(z)$ .

Q3) Attempt any two:

[2 × 8 = 16]

- a) Apply bilinear transformation to  $H(s) = \frac{2}{(s+1)(s+2)}$  with  $T = 1$  sec & find  $H(z)$ .
- b) Explain impulse invariant method for IIR filter design & why this method is not preferred in the design of IIR filter other than low pass filter.
- c) Explain quantization and rounding in digital filter. Explain its effect on the digital filtering.

### SECTION-II

Q4) Attempt any two:

[2 × 9 = 18]

- a) What is adaptive filter ? Explain various applications of adaptive filter.
- b) Explain in detail basic 'LMS algorithm'. What are its practical limitations.
- c) State & explain important properties of wavelet transform.

Q5) Attempt any two:

[2 × 8 = 16]

- a) What are drawbacks of DWT? Explain in detail the process of decomposition.
- b) What is DCT? Explain its properties.
- c) Write a note on 'Applications of discrete cosine transform'.

Q6) Attempt any two:

[2 × 8 = 16]

- a) Explain application of DSP in 'speech processing'.
- b) Explain application of wavelet transform in Image compression.
- c) Explain the concept of adaptive noise cancelling.

