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| 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 : $F = 8000$ Hz

cut-off frequencies : $F_{c_1} = 1000$ Hz

$F_{c_2} = 3000$ 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: $H_d(e^{j\omega}) = 1$ for $\frac{\pi}{4} \leq |\omega| \leq \pi$

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

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.

