Total No. of Questions : 8]

P315

SEAT No. :

[Total No. of Pages : 2

[6003] 395 T.E. (E & TC)

DIGITAL SIGNAL PROCESSING

(2019 Pattern) (Semester - I) (Elective - I) (304185(A))

Time : 2¹/₂ Hours] Instructions to the candidates: [Max. Marks : 70

- 1) All questions are compulsory.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Your answers will be valued as a whole.
- 5) Use of lograrithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 6) Assume suitable data, if necessary.
- *Q1*) a) Compute the 5-point DFT for the given sequence $x[n] = \{1, 0, 1, 0, 1\}$.[6]
 - b) State and prove any two important properties of DFT. [6]
 - c) Compare DFT and FFT on the basis of computational complexity for N = 64, 256 & 1024. [6]
- Q2) a) Determine the sequence $y(n) = x(n) \mathbb{N} h(n)$ where $x(n) = \{1, 2, 3, 3\}$ and $h(n) = \{4, 3, 2, 2\}$ [8]

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b) Find the 8 point DFT of sequence $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$ using decimation in time radix-2 FFT algorithm. [10]

P.T.O.

- Q4) a) Compare impulse invariance and bilinear transformation methods. [7]
 - b) The system transfer function of analog filter is given by s+0.1

$$H(s) = \frac{s+o.1}{(s+0.1)^2 + 16}$$
. Obtain the system transfer function of digital

filter using bilinear transformation which is resonant at $W_r = \frac{\pi}{2}$. [10]

[6]

 $[4 \times 2.5 = 10]$

[8]

- Q5) a) List out the advantages and disadvantage of FIR filters. [6]
 - b) Explain the Gibb's phenomenon.
 - c) Design a linear phase FIR low pass filter of length seven with cut-off frequency 1 rad/sec using rectangular window. [6]
 OR
- *Q6*) a) Find the magnitude and phase response function of seventh order low pass linear phase FIR filter with cut-off frequency 1rad/sec using Hanning window. [8]
 - b) Design an FIR filter with Hamming window for following specification[10] π π

$$\operatorname{H}d(w) = e^{-j3w} - \frac{\pi}{4} \le w \le \frac{\pi}{4}$$
$$= 0 \qquad \frac{\pi}{4} < w \le \pi$$

- Q7) a) Write short notes on:
 - i) Identification of voiced and unvoiced sound
 - ii) LTI representation of speech signal
 - iii) Basics of ECG signal
 - iv) Power line interference
 - b) Describe the ECG signal with the help of neat sketch and elaborate types of interference. [7]

OR

Q8) a) List out the R-peak detection methods and explain in detail any one of the promenent technique. [9]

- b) Write short notes on:
 -) Spatial and temporal resolution
 - ii) 2D convolution for feature extraction

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