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Question Paper Code : 51453

B.E/B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Fifth Semester

Electronics and Communication Engineering

EC 2302/EC 52 – DIGITAL SIGNAL PROCESSING

(Regulations 2008)

(Common to PTEC 2302 Digital Signal Processing for B.E. (Part-Time) Electronics and Communication Engineering Fourth Semester – Regulations 2009)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. State the advantages of FFT over DFTs.

2. What is meant by bit reversal ?

3. Mention the advantages of cascade realization.

4. Convert the given analog transfer function $H(s) = \frac{1}{s+a}$ into digital by impulse invariant method.

5. Give the equations specifying Hamming and Blackman window.

6. Realize the following causal linear phase FIR system function :

$$H(z) = \frac{2}{3} + z^{-1} + \frac{2}{3} z^{-2}$$

7. State the need for scaling in filter implementation.

8. What is product round-off noise ?

9. Give the steps in multistage sampling rate converter design.

10. Write any four applications of multi-rate signal processing.

PART – B (5 × 16 = 80 Marks)

11. (a) With appropriate diagrams describe

(i) overlap-save method **(8)**

(ii) overlap-add method **(8)**

OR

(b) Explain Radix-2 DIF-FFT algorithm. Compare it with DIT-FFT algorithms. **(16)**

12. (a) A desired low pass filter with the following specification is

$0.8 \leq |H(\omega)| \leq 1.0; 0 \leq w \leq 0.2\pi$

$|H(\omega)| \leq 0.2; 0.3\pi \leq \omega \leq \pi$

Design Butterworth digital filter using impulse invariant transformation.

OR

(b) (i) Obtain the cascade form realization of the digital system

$$y(n) = \frac{3}{4}y(n-1) - \left(\frac{1}{8}\right)y(n-2) + \frac{1}{3}x(n-1) + x(n).$$ **(8)**

(ii) Convert the given analog filter with a transfer function. **(8)**

$H(s) = \frac{2}{(s+1)(s+2)}$ into a digital IIR filter using bilinear transformation.

Assume T = 1 sec.

13. (a) Explain the designing of FIR filters using frequency sampling method. **(16)**

OR

(b) (i) State and explain the properties of FIR filters. State their importance. **(8)**

(ii) Explain linear phase FIR structures. What are the advantages of such structures ? **(8)**

14. (a) Discuss the following :

(i) Product quantization error (8)

(ii) Limit cycle oscillations. (8)

OR

(b) (i) Derive the equation for rounding and truncation errors. (8)

(ii) Derive the equation for quantization noise power. (8)

15. (a) (i) Explain the implementation steps in speech coding using transform coding. (8)

(ii) Discuss the design steps involved in the implementation of multistage sampling rate converter. (8)

OR

(b) Explain the efficient implementation of polyphase decimator and interpolator. (16)
