G 1223 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 604—DIGITAL SIGNAL PROCESSING (EE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Define linear systems and causal systems.
2. Find DTFT of $x(n) = e^{2n}$ for all n.
3. What are the features of Chebyshev filters ?
4. What is Gibb's phenomenon ?
5. Explain the quantization error in digital filters.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Determine the Z transform of $x(n) = \sin\left(\frac{\pi n}{2}\right) u(n)$.
7. Find the DTFT of the sequence $x(n) = \{1, 2, 3, 4\}$.
8. Draw the Direct Form-I of the system given by :

   $y(n) = 0.5\, y(n-1) - 0.25 y(n-2) + x(n)$.
9. Explain the FIR filter design by frequency sampling method.
10. Describe the principle of speech processing.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Find the convolution sum of the given sequences :

$x_1(n) = \{0, 1, 2, 3, 4, 5\}$ and $x_2(n) = \{1, -1, 1, -1\}$.

Or

12. Determine the impulse response of the system determined by the equation :

$y(n) - 5y(n-1) + 6y(n-2) = x(n)$.

13. Draw the flow graph of 16 point DFT using DIT-FFT algorithm.

Or

14. Find the 8 point DFT of the sequence $x(n) = \{1, -1, 0, 1, -1, 0, 1, 1\}$.

15. Using bilinear transformation design a Butterworth digital filter from the following specifications

$f_{pass} = 1000$ Hz

$f_{stop} = 1500$ Hz.

$\alpha_s = 20$ dB.

Sampling frequency = 5kHz.

Or

16. A system is defined by the following difference equation

$$y(n) - 3y(n-1) + \frac{1}{2}y(n-2) = x(n) + 2x(n-1).$$

Implement the system using :

(a) Parallel form.

(b) Cascaded form.

17. (a) What is the need of different windows in FIR filter design.

(b) Give expression and frequency response of Kaiser window and Hamming window.

Or

18. Consider an FIR filter of length M = 4 for which the frequency response is specified as :

$H_r(0) = 1 ; w = 0.$

$H_r(\pi/2) = \frac{1}{2} ; w = \pi/2.$

Determine the unit sample response $h(n)$.

19. With a block schematic explain the architecture of TMS 320 C 54 Digital Signal Processor.

Or

20. Determine the variance of the round off noise at the out put of the two cascade realizations of the filter with the system function

$H(z) = H_1(z) . H_2(z).$

where $H_1(z) = \frac{1}{1 - \frac{1}{2} z^{-1}}, H_2(z) = \frac{1}{1 - \frac{1}{4} z^{-1}}.$

(5 × 12 = 60 marks)