G 1440 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2016

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. Explain any *three* types of standard test signals.
2. What is a butterfly structure in FFT computation ?
3. Compare Chebyshev type I and type II filters.
4. How window functions are useful in the design of FIR filters ?
5. What are the problems of finite register length, in digital systems.

(5 × 3 = 15 marks)

Part B

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

6. How systems are classified ? Explain any *five* types of systems.
7. Perform linear convolution of the sequences $x_1[n] = \{2, -1, -2, 1\}$ and $x_2[n] = \{4, 3, 1, 2\}$.
8. Realize the given system in cascade form :

$$H(z) = \frac{1 + 0.25z^{-1}}{\left\{\left(1 - 2z^{-1} + 0.25z^{-2}\right)\left(1 - 3z^{-1} + 0.2z^{-2}\right)\right\}}.$$

9. How will you design an FIR filter using frequency sampling method ?
10. What do you understand by limit cycle oscillations in an IIR filter ?

(5 × 5 = 25 marks)

Turn over

Part C

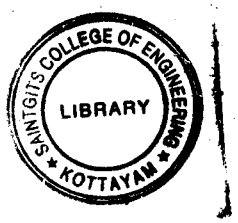
Answer **all** *questions.*
Each question carries 12 *marks.*

11. Determine the inverse z transform of $X(z) = \dfrac{1}{1 - 1.5\,z^{-1} + 0.5\,z^{-2}}$,

when (a) ROC: $|z| > 1$

and

(b) ROC : $|z| < 1$.



Or

12. Determine the step response of the causal system

$$y[n] = -a_1\, y[n-1] + b_0 x[n] + b_1\, x[n-1], \text{ if } y[-1] = A \neq 0.$$

13. Find the response of the system with input $x[n]$ and impulse response $h[n]$, using overlap sav method. Given $h[n] = \{1, 2, 3\}$ *and* $x[n] = \{3, -1, 0, -3, 4, 2, -1, 1, -2, 3, 2\}$.

14. Find the 8 point DFT of $x[n] = \{1, 1, 1, 1, -1, -1, -1, -1\}$. Use DIF-FFT algorithm.

15. Find Direct form I and Direct form II realizations for the system described by the syste function :

$$H(z) = \frac{2z^3 - 4z^2 + 11z - 8}{(z-8)\left(z^2 - z + 3\right)}.$$

Or

16. A digital IIR low-pass filter is required to meet the following frequency specifications : pass ban ripple ≤ 4.436 dB, passband edge frequency = 0.35 Π rad/sample, stop band attenuation ≥ 20 dB stop band edge frequency = 0.7 Π rad/sample. Determine the order of the digital Butter wort filter, designed by bilinear transformation. Take T = 0.1 second.

17. Design a linear phase FIR low-pass filter using rectangular window by taking 7 samples of window sequence and with a cut-off frequency $\omega = 0.2\ \Pi$ rad/sample.

Or

18. Design a low-pass filter with cut-off frequency of 1 kHz and sampling frequency of 4 kHz with 11 samples using Fourier series method.

19. Explain the internal block diagram of TMS 320 C54xx processor.

Or

20. Explain various types of errors present in digital filter implementation.

(5 × 12 = 60 marks)