

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) II Semester (Suppl.) Examination, December 2012

Subject: Digital Signal Processing

Time: 3 Hours

Max.Marks: 75

Note : Answer all questions from Part A. Answer any Five questions from Part B.**PART – A (25 Marks)**

1. Test whether the following systems are stable or not.
(a) $h(n) = n.u(n)$ (b) $h(n) = a^n.u(n)$ (3)
2. Derive the expression for convolution sum. (2)
3. State any four properties of DFT. (3)
4. Contrast Decimation-in-time and decimation-in-frequency FFT algorithms. (2)
5. Give the expression for Blackman Window function. (2)
6. Compare FIR and IIR filters. (3)
7. Using Impulse Invariant Method, obtain $H(z)$ from $H(s) = \frac{3}{s^2 + 5s + 6}$. (3)
8. Determine the order of LPF if it has pass band attenuation of -3dB at 800 rad/sec and stop band attenuation of -10dB at 1800 rad/sec. (2)
9. What are the unique features of digital signal processor? (2)
10. What is barrel shifter? What are its advantages? (3)

PART – B (50 Marks)

11. Find the forced response of the system described by $y(n) = \frac{3}{5}y(n-1) - \frac{2}{25}y(n-2) + x(n) - 3x(n-1)$ when input is $x(n) = 3^n.u(n)$ and when $x(n) = \sin 2n$. (10)
12. Determine the DFT of $x(n) = \{2, 1, 4, 6, 5, 8, 3, 9\}$ using decimation-in-frequency FFT algorithm. (10)
13. Find convolution of $h(n) = \{1, -3, 5\}$ and $x(n) = \{-1, 4, 7, 3, -2, 9, 10, 12, -5, 8\}$ using overlap-add method. (10)
14. Design an ideal LPF using rectangular window of $N=9$ whose response is

$$H_d(e^{jw}) = 1, \frac{\pi}{3} \geq w \geq \frac{-\pi}{3}$$

$$= 0, \text{ elsewhere.}$$
 (10)
15. Design high pass butterworth filter using bilinear transformation using following specifications.
 $w_p = 350$ Hz, $w_s = 1250$ Hz, $\alpha_p = -3$ dB, $\alpha_s = -10$ dB, $F_s = 5000$ Hz. (10)
16. Explain the architecture of TMS 320C 54xx processor with the help of a neat diagram. (10)
17. Write short notes on two of the following: (10)
 - (a) Realization of FIR filters
 - (b) Inplace FFT computation
 - (c) Sampling of analog signals.
