Code No. : 5091/M

FACULTY OF ENGINEERING

B.E. 3/4 (E & EE/Inst.) II Semester (Main) Examination, May/June 2012

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. $x(t) = 5\cos 200\pi t + 3\sin 6000\pi t + 2\cos 12000\pi t$. Determine the sampling frequency of the above signal. **2**

2. Compute the convolution of the following signals : **3**

   $x(n) = \{1, 2, 3, 4\}$, $h(n) = \{1, 1, 1\}$.

3. What are the two properties of twiddle factor which reduces the number of multiplications and addition in FFT ? **2**

4. What is the difference between DTFT and DFT ? **3**

5. Find the Z transform and ROC of the following signal ? **3**

   $x(n) = -b^n u(-n-1)$

6. Define one sided z-transform. **2**

7. Write the expression for the order of the filter for Chebyshev filter. **2**

8. Find the digital filter H(z) from given analog filter below using impulse invariant method.

   $$H(s) = \frac{1}{s(s+1)}$$ **3**

9. What is the advantage of very large instruction word architecture in digital signal processor ? **3**

10. What is the necessary condition for FIR filter to have a linear phase ? **2**

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PART – B (5×10=50 Marks)

11. A system has the unit sample response $h(n) = \frac{1}{2}[\delta(n) + \delta(n-2)]$, determine and sketch the frequency response of the system. 10

12. Obtain radix – 2 DITFFT algorithm and find DFT of the following signal

$x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$ 10

13. a) Write symmetry properties of DFT. 5

b) Define energy signal and power signal. Determine whether unit step and unit ramp are energy signals or power signals ? 5

14. a) Determine the impulse response of the following system using z-transform method.

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

b) Write the properties of z-transform. 5

15. Design a butterworth low pass filter for the specifications given below. 10

i) – 3db cut off frequency of 100 rad/sec

ii) – 25 db cutoff frequency of 250 rad/sec.

16. a) Write design procedure of FIR filter. 5

b) Explain the CALU, ARAU of TMS 320 c5x architecture. 5

7. Write short notes on :

a) Bilinear Transformation 5

b) Sampling, quantizing and coding. 5