

FACULTY OF INFORMATICS

BE 3/4 (IT) I-Sem (New) (Main) Examinations, November / December 2012

Subject: Digital Signal Processing

Time: 3 Hours

Max. Marks:75

Note: 1. Answer All questions from Part-A & Any Five questions From Part-B
2. Assume suitable missing data of any

Part-A

1. Compare DFT and FFT. (3)
2. Show how FFT of a N-point sequence can be computed using two N/2 point DFT's. (3)
3. State the condition for a filter to have constant group delay in terms of impulse response. (3)
4. A non casual FIR filter cannot be realized. Is it true? Justify. (2)
5. What is the transformation required to transform a LPF to BPF. (3)
6. Can you use Direct form –II to implement a 20th order filter. Justify. (2)
7. Significance of Barrel Shifter. (2)
8. List the on-chip peripherals. (2)
9. Properties of auto correlation. (3)
10. Huffman decoding. (2)

Part-B

11. a) A System is described by the difference equation (6)

$$Y(n) = 3y(n-1) + 2y(n-2) + x(n).$$
 - (i) Find the impulse response of the system
 - (ii) Is it stable.
- b) Compute the DFT of $x(n) = [4 \ 3 \ 2 \ 1]$ (4)
12. a) Show that FIR filters have linear phase characteristics. (5)
- b) Design a FIR band pass filter of length 11 to approximate the ideal characteristics with pass band cut off frequencies at 500 Hz and 600 Hz use Hamming window. (5)
13. a) Compare FIR and IIR filters (4)
- b) Convert the analog filter $H_a(s)$ to a digital filter using impulse invariant method, when (6)

$$H_a(s) = \frac{s+2}{s^2+3s+6}$$
14. a) Explain what is meant by prewarping. (2)
- b) Design a digital Butter worth high pass filter to meet the following specifications. (8)
 pass band cutoff frequency : 1000 Hz .
 Stop band cutoff frequency : 200 Hz .
 Alternation in PB ≤ 3 dB
 Alternation in SB ≥ 10 dB
15. a) Draw the block diagram of 54 x X processor and explain its salient features (5)
- b) Explain the pipelining stages of 54 x X processor. (5)
16. a) Draw the model of speech generating system and explain (5)
- b) Write the assembly code to estimate the pitch period (5)
17. Write short notes on any two (10)
 - (i) Equiripple FIR filters
 - (ii) Round off errors in digital filters
 - (iii) Data addressing modes