C **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 55401

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Fifth Semester

Electronics and Communication Engineering

15UEC501 - DIGITAL SIGNAL PROCESSING

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. How many additions are required to compute N point DFT CO1-R

   (a) N log 2 N (b) (N +1) log2N (c) Nlog2(N=1) (d) None of these

2. How to define IIR filters term as infinite: CO2-R

   (a) As with any feedback device, create a loop, hence the term infinite.

   (b) As with any non-feedback device, create a loop, hence the term infinite.

   (c) As with any feedback device, create a open loop, hence the term infinite.

   (d) None of above

3. Why FIR filter is always stable ---------- CO3-R

   (a) all poles will lie at the origin (b) all poles will lie at the origin (c) all poles will lie at the right side (d) None of these

4. What is scaling? CO4-R

   (a) Scaling must be done in such a way that no overflow occurs at the summing point

   (b) Scaling must be done in such a way that overflow occurs at the summing point

   (c) Scaling must be done in such a way that no underflow occurs at the summing point.

   (d) None of above

5. Instruction Pipelining order of operations CO5-App

   (a) Fetch, Read, Decode, Execute (b) Read, Decode, Fetch, Execute

   (c) Fetch, Decode,Read,Execute (d) Fetch, Read, Execute, Decode

PART – B (5 x 3= 15 Marks)

6. List the properties of DFT and explain**.** CO1-U

7. What is bilinear transformation? What are the main advantages of this technique? CO2- R

8. Write the window function of Hamming window and Hanning window. CO3- R

9. What is meant by zero limit cycle oscillations? CO4- U

10. What is meant by pipelining? CO5- R

PART – C (5 x 16= 80Marks)

11. (a) An 8-point discrete time sequence is given by x(n) = {1,1,0,0,0,0,0,0}. Compute the 8-point DFT of x(n) using DIT algorithm CO1- App (16)

Or

(b) Find CO1- App (16)
y(n)=x(n)*h(n) for the sequences
x(n)={1,2,-1,2,3,-2,-3,-1,1,1,1,2,-1} and h(n)={1,2}.
compare the result by solving the problem using overlap save method and overlap add method.

12. (a) Design a digital Butterworth filter satisfying the constraints CO2- App (16)

$$0.707 \le H(e^{j\omega}) \le 1 \quad for \quad 0 \le \omega \le \frac{\pi}{2}$$

$$H(e^{j\omega}) \le 0.2 \quad for \quad \frac{3\pi}{4} \le \omega \le \pi$$

With T=1 sec, Use Bilinear transformation

Or

(b) (i) For the analog transfer function CO2- App (8)

$H(s) = \frac{2}{(s+1)(s+2)}$

Determine H (z) using impulse invariant method. Assume T=1sec

(ii) Obtain the cascade and parallel realization for the system function given by CO2- App (8)

$$H(z) = \frac{1+0.25Z^{-1}}{(1+0.5Z^{-1})(1+0.5Z^{-1}+0.25Z^{-2})}$$

13. (a) Design a HPF with the following frequency response CO3- App (16)
$H_d(e^{j\omega})=1$ for $\pi/4 \le |\omega| \le \pi$
$=0$ for $|\omega| \le \pi/4$ of length N=11 using Hamming Window

Or

	(b)	(i) State and explain the properties of FIR filters. State their importance.	CO3- U	(8)
		(ii) Explain linear phase FIR structures. What are the advantages of such structures?	CO3- U	(8)
14.	(a)	Explain the characteristics of limit cycle oscillations with respect to the system described by the difference equation y(n)=0.95y (n-7)+x(n) With x(n)= 0 and initial condition y (-1) =12. Determine the dead band of the system.	CO4- U	(16)
		Or		
	(b)	Study the limit cycle behavior of the system y (n)=0.95y(n-1)+x(n),when the product is quantized by rounding and five bit sign-magnitude binary representation is used.	CO4- App	(16)
15.	(a)	Explain DSP building block, multipliers, shifters, MAC unit of a typical DSP processor.	CO5- U	(16)
		Or		
	(b)	(i) Explain the addressing modes of TMS320C5x with examples.	CO5- U	(8)
		(ii) Explain the operation of TDM serial ports in P-DSPs.	CO5- U	(8)

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