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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech III Year I Semester Supplementary Examinations August-2021

DIGITAL SIGNAL PROCESSING

(Common to ECE & EEE)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

- 1 a What is the relationship between Fourier series coefficients of a periodic sequence and DFT? 2M
- b What is the main disadvantage of direct form realization? 2M
- c Define Gibb's phenomenon. 2M
- d What is meant by input quantization error? 2M
- e Mention the applications of PDSP's. 2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

- 2 a Compute the 4-point DFT of the sequence and plot magnitude and phase response 7M
 $x(n) = 1 \quad ; \quad 0 \leq n \leq 2$
 $= 0 \quad ; \quad \text{otherwise}$
- b Explain the relationship between DFT to the Z-Transform. 3M

OR

- 3 Compute 8-point DFT of the sequence $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$ using radix-2 DIT-FFT Algorithm. 10M

UNIT-II

- 4 a For the analog transfer function $H(s) = \frac{2}{(s+1)(s+2)}$, Determine $H(z)$ using impulse invariance method. Assume $T=1$ Sec. 5M
- b An LTI System is described by the difference equation 5M
 $y(n) + a_1 y(n-1) = x(n) + b_1 x(n-1)$. Determine its direct form I structure.

OR

- 5 Determine an analog Chebyshev filter transfer function that satisfies the constraints 10M

$$\frac{1}{\sqrt{2}} \leq |H(j\Omega)| \leq 1 \quad ; \quad 0 \leq \Omega \leq 2$$

$$|H(j\Omega)| \leq 0.1 \quad ; \quad \Omega \geq 4$$

UNIT-III

- 6 Design an ideal Low Pass Filter with a frequency response 10M

$$H_d(e^{j\omega}) = 1 \quad \text{for} \quad -\frac{\pi}{2} \leq |\omega| \leq \frac{\pi}{2}$$

$$= 0 \quad \frac{\pi}{2} \leq |\omega| \leq \pi$$

Find the values of $h(n)$ for $N=11$. Find $H(z)$ and plot the magnitude response.

OR

- 7 a Determine the Direct form realization of system function 5M
 $H(z) = 1 + 2z^{-1} - 3z^{-2} - 4z^{-3} + 5z^{-4}$
- b State and explain the properties of FIR filters. State their importance. 5M

UNIT-IV

- 8 a Compare floating point with fixed point arithmetic. 5M
- b Summarize the various forms of representing the numbers in digital systems. 5M

OR

- 9 Explain the characteristics of a limit cycle oscillation with respect to the system described by the equation $y(n) = 0.95y(n-1) + x(n)$, when the product is quantized to 5 bits by rounding. The system is excited by an input $x(n) = 0.75$ for $n=0$ and $x(n)=0$ for $n \neq 0$. Also, determine the dead band of the filter. 10M

UNIT-V

- 10 a List status registers bits of 5X and their functions. 5M
- b Categories the various interrupt types supported by 5X? 5M

OR

- 11 With a neat sketch explain the architecture of TMS 320C50 processor. 10M

END