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

**B.Tech IV Year I Semester Supplementary Examinations February-2022**

**DIGITAL SIGNAL PROCESSING**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

**UNIT-I**

- 1 a Find impulse response of the system described by the difference equation 6M  
 $y(n) + y(n-1) - 2y(n-2) = x(n-1) + 2x(n-2)$ .
- b Find 4-point DFT of the sequence  $x(n) = \{1, 6, 4, 3\}$ . 6M

**OR**

- 2 a Find 8 point DFT of the sequence  $x(n) = [1, 2, 1, 0, 2, 3, 0, 1]$  7M
- b Describe the relation between i) DFT to Z- transform ii) DFT to Fourier Series. 5M

**UNIT-II**

- 3 a Construct Radix-4 DIF FFT algorithm with neat sketch. 6M
- b Compare DFT and FFT algorithms. 6M

**OR**

- 4 a Explain divide and conquer approach to computation of the DFT. 6M
- b Explain Radix-4 FFT algorithm with neat butterfly diagram. 6M

**UNIT-III**

- 5 a Discuss the realization of FIR filter structures. 6M
- b Determine the cascade form realization for the following FIR filter with system function 6M  
 $H(z) = 1 + (5/2)z^{-1} + 2z^{-2} + 2z^{-3}$ .

**OR**

- 6 Determine the direct form I, direct form-II, cascade and parallel form realization for the 12M  
system  $y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$ .

**UNIT-IV**

- 7 a Explain about frequency transformation in analog domain. 6M
- b Compare FIR and IIR filters. 6M

**OR**

- 8 Design an analog Butterworth filter that has a -2db pass band attenuation at a frequency of 12M  
20rad/sec and at least -10dB stop band attenuation at 30 rad/sec (assume  $\Omega_c = 21.3868$  rad/sec).

**UNIT-V**

- 9 a Explain about characteristics of practical frequency selective filters 8M
- b What are the merits and demerits of FIR filters? 4M

**OR**

- 10 Explain the following 12M  
i) Rectangular window  
ii) Hamming window  
iii) Hanning window

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