**Q.P. Code: 16EC422** **R16**

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

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**

(AUTONOMOUS)

**B.Tech III Year II Semester Regular Examinations May 2019**

**DIGITAL SIGNAL PROCESSING**

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 60

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

**UNIT-I**

| | | | |
|---|---|---|---|
| **1** | a | Explain the power signal and Energy signal. | 4M |
| | **b** | Determine the linear convolution for the two sequences x(n)={3,2,1,2},h(n)= {1,2,1,2} using circular convolution. | 8M |

**OR**

| | | | |
|---|---|---|---|
| **2** | **a** | Find impulse response of the system described by the difference equation y(n)+ y(n-1)-2y(n-2)= x(n-1)+2x(n-2). | 6M |
| | **b** | Derive the expression for DFT. Describe the relation between i) DFT to Z- transform ii) DFT to Fourier Series. | 6M |

**UNIT-II**

| | | | |
|---|---|---|---|
| **3** | **a** | How the periodic and symmetry properties of DFT help to reduce the complex multiplications and additions in FFT? Explain | 4M |
| | **b** | Construct Radix-4 DIT FFT algorithm with neat sketch. | 8M |

**OR**

| | | | |
|---|---|---|---|
| **4** | **a** | Construct the decimation in frequency FFT algorithm with butterfly diagram for N=8 | 10M |
| | **b** | Compare radix-2 DIT-FFT and DIF-FFT algorithms. | 2M |

**UNIT-III**

| | | | |
|---|---|---|---|
| **5** | a | Explain lattice & lattice-ladder structure for IIR digital filter. | 4M |
| | **b** | Obtain Cascade and Parallel form realization of following system: y(n) = 0.75y(n-1)-0.125y(n-2)+3x(n)+7x(n-1)+x(n-2) | 8M |

**OR**

| | | | |
|---|---|---|---|
| **6** | **a** | Illustrate the realization of the IIR filter in cascade form. | 7M |
| | **b** | Find the lattice form structure for the following difference equation y(n) = x(n)-1/2 y(n-1) -1/3 y(n-2) – ¾ y(n-3). | 5M |

**UNIT-IV**

| | | | |
|---|---|---|---|
| **7** | | Using the bilinear transform, design a high pass filter, monotonic in pass band with cut off frequency of 100Hz and down 10dB at 350 H. the sampling frequency is 5000Hz. | 12M |

**OR**

| | | | |
|---|---|---|---|
| **8** | **a** | Design a Chebyshev filter for the following specifications using Impulse invariant method<br>$0.8 \le \lvert H(e^{jw})\rvert \le 1$ $0 \le w \le 0.2\pi$<br>$\lvert H(e^{jw})\rvert \le 0.2$ $0.6\pi \le w \le \pi$ | 7M |
| | **b** | Compare FIR and IIR filters. | 5M |

**UNIT-V**

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|---|---|---|---|
| **9** | **a** | What is linear Phase? Deduce the condition for linear phase in FIR filter. | 5M |
| | **b** | Design a filter with $H_d(e^{j\omega}) = e^{-j3\omega}$; $-\pi/4 \le \omega \le \pi/4$<br>$= 0$; $\pi/4 \le \omega \le \pi$<br>Using Hanning window with N = 7 | 7M |

**OR**

| | | | |
|---|---|---|---|
| **10** | **a** | Discuss the characteristics of hamming window. | 7M |
| | **b** | Discuss the design a linear phase FIR filter using frequency sampling method. | 5M |

*** END ***