Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov/Dec – 2017**

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| **Code :** | **14EC2014** | **Duration :** | **3hrs** |
| **Sub. Name :** | **DIGITAL SIGNAL PROCESSING** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Find y(n) = x(n)\*h(n) for the sequences x(n) = {3,-1,0,1,3,2,0,1,2,1} and h(n) = {1,1,1} using overlap add method. | CO1 | 16 |
| b. | Determine the 4-point DFT of the sequence | CO1 | 4 |
| (OR) | | | | |
| 2. | a. | Determine the output if  using i. Linear convolution ii. Circular convolution. | CO1 | 6 |
| b. | Findfor the input sequence and impulse response using overlap save method. | CO1 | 14 |
|  |  |  |  |
| 3. | a. | Calculate the number of multiplications needed in the calculation of DFT using direct computation and FFT algorithm for N= 16. | CO1 | 4 |
|  | b. | Find DFT of the sequence using radix-2 DIT FFT algorithm,. Find the magnitude and phase of the Fourier co-efficients. | CO1 | 16 |
| (OR) | | | | |
| 4. | a. | Find 8-point DFT of the sequence  using radix - 2 DIF FFT algorithm. | CO1 | 16 |
|  | b. | Write FFT equation using twiddle factor and list out the properties of twiddle factor. | CO1 | 4 |
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| 5. | a. | Design a digital Butterworth filter satisfying the following specifications using Bilinear transformation technique. Assume T= 1 sec. | CO2 | 16 |
|  | b. | Distinguish IIR and FIR digital filters. | CO2 | 4 |
| (OR) | | | | |
| 6. | a. | Design a Chebyshev I digital IIR low pass filter using the impulse invariant method by taking T=1 sec. | CO2 | 15 |
|  | b. | Use Impulse invariance technique to obtain H[z] for the analog transfer function  . Assume T= 1sec. | CO2 | 5 |
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| 7. | a. | For a linear phase FIR digital filter, the ideal frequency response is given by    Determine the coefficients of 9 tap filter using rectangular window and draw the linear phase realization of h(n). | CO2 | 10 |
|  | b. | Illustrate zero-input limit cycle oscillations with an example. | CO3 | 10 |
| (OR) | | | | |
| 8. | a. | Design and implement a linear phase FIR filter of length N=15 which has the following unit sample sequence using frequency sampling method. | CO2 | 10 |
|  | b. | State the effect of quantization on different representation of binary numbers. | CO3 | 10 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Derive the Wiener-Hopf equation and explain basic wiener filter theory in detail. | CO3 | 10 |
|  | b. | A multiplier-accumulator, with three pipe stages, is required for a digital signal processor. Sketch the block diagram of a suitable configuration for the Non-pipelined and pipelined MAC. With the aid of a timing diagram, explain how the pipelined MAC works. | CO3 | 10 |

ALL THE BEST