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



**End Semester Examination – Nov / Dec – 2019**

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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. | Findfor the sequences and using overlap save method. | CO1 | 16 |
| b. | Compare linear with circular convolutions. | CO1 | 4 |
| **(OR)** | | | | |
| 2. | a. | Compute 8 point DFT of a sequence x(n) = 2sin(nπ/4) using radix-2 DIT-FFT algorithm. | CO1 | 16 |
| b. | **Compare the DIF-FFT with DIT-FFT algorithms.** | CO1 | 4 |
|  |  |  |  |  |
| 3. | a. | Using the radix-2 DIF FFT algorithm, compute the 8 point DFT of the sequence. Draw the flow graph and show all the intermediate results. | CO1 | 16 |
| b. | Determine the DFT of the sequence | CO1 | 4 |
| **(OR)** | | | | |
| 4. | a. | Findfor the input sequence and impulse response  using overlap add method. | CO1 | 16 |
| b. | Give the computational efficiency of 1024 point FFT over 1024 point DFT. | CO1 | 4 |
|  |  |  |  |  |
| 5. | a. | Design a digital Butterworth filter that satisfies the following constraints using bilinear transformation. Assume T=1 s. | CO2 | 16 |
| b. | Using impulse invariance method convert the following analog transfer function into digital with sampling period T= 0.2 second. | CO2 | 04 |
| **(OR)** | | | | |
| 6. | a. | Design a Chebyshev filter for the following specifications using impulse invariance method. | CO2 | 16 |
| b. | **What is many to one mapping? Explain in detail.** | CO2 | 04 |
|  |  |  |  |  |
| 7. | a. | Design a linear phase FIR digital filter for the given specifications using Hamming window. | CO2 | 16 |
| b. | **Define linear phase filter. Derive the condition to be satisfied by the impulse response in order to have a linear phase.** | CO2 | 04 |
| **(OR)** | | | | |
| 8. | a. | Determine the filter coefficients obtained by frequency sampling for N = 7. | CO2 | 16 |
| b. | Draw the linear phase realization of  H(z) = ½ + 1/3 z-1 + z -2 + ¼ z-3  + z-4 + 1/3 z-5+ ½ z-6 | CO2 | 04 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Explain the basic Wiener filter theory and discuss its limitations. | CO3 | 10 |
| b. | Consider the LTI system governed by the equation y[n]+0.92y[n-1]+0.35y[n-2] = x[n-2].  Discuss the effect of co-efficient quantization on pole locations when the co-efficients are quantized using;  i) 3 bits by truncation ii) 4 bits by truncation.  Comment on the results. | CO3 | 10 |