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

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**End Semester Examination – Nov/Dec – 2018**

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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. | 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 | 15 |
| b. | The impulse response of an LTI system is . Find the response of the system for the input. | CO1 | 5 |
| (OR) | | | | |
| 2. | 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,. | CO1 | 16 |
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| 3. | a. | Find for the sequences and using overlap save method. | CO1 | 16 |
| b. | Determine the DFT of the sequence for N=4. | CO1 | 4 |
| (OR) | | | | |
| 4. | 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 DFT of the sequence | CO1 | 4 |
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| 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 | 4 |
| (OR) | | | | |
| 6. |  | Design a Chebyshev filter for the following specifications using impulse invariance method. | CO2 | 20 |
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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 | 16 |
| b. | **Define linear phase filter. Mention the condition to be satisfied by the impulse response in order to have a linear phase.** | CO2 | 4 |
| (OR) | | | | |
| 8. |  | Design and implement a linear phase FIR filter of length N=15 by frequency sampling method which has the following unit sample sequence . | CO2 | 20 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Compare Van-Neumann and Harvard architectures with necessary diagrams. | CO3 | 10 |
| b. | Explain the basic operation of adaptive filter and show how LMS algorithm is used in it. | CO3 | 10 |