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



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

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| **Code :** | **17EC2010** | **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 the output y(n) of the filter whose impulse response h(n)={1,2} and input sequence x(n)={1, 2, -1, 2, 3,- 2, -3, -1, 1, 1, 2, -1} using Overlap add method. | CO1 | | 14 |
| b. | The impulse response of an LTI system is. Find the response of the system for the input. | CO2 | | 06 |
| **(OR)** | | | | | |
| 2. | a. | Give one application of DSP in everyday life. | CO2 | | 05 |
| b. | Find 8-point DFT of a sequence x(n)={1, 1, 1, 1, 0, 0, 0, 0} using DIT-FFT radix-2 algorithm. Use butterfly diagram. | CO6 | | 15 |
|  |  |  |  | |  |
| 3. | a. | Findfor the sequences;  and using overlap save  method. | CO2 | | 15 |
| b. | Determine the DFT of the sequence for N=4. | CO2 | | 05 |
| **(OR)** | | | | | |
| 4. | a. | **List the differences and similarities between DIF and DIT algorithms.** | CO2 | | 05 |
| b. | Determine the output response if by using;  (i) Linear convolution (ii) circular convolution  (iii) Linear from Circular convolution. | CO2 | | 15 |
|  |  |  |  | |  |
| 5. | a. | Design a digital Butterworth filter that satisfies the following constraints using bilinear transformation. Assume T=1 s. | CO3 | | 15 |
| b. | Using impulse invariance method convert the following analog transfer function into digital with sampling period T= 0.2 second | CO3 | | 05 |
| **(OR)** | | | | | |
| 6. | a. | Realize the FIR filter  H(z)= 0.5++++++ in direct form  I and II. | | CO3 | 10 |
| b. | Design a Chebyshev filter for the following specifications using impulse invariance method. | | C03 | 10 |
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| 7. | a. | Design a lowpass filter using rectangular window by taking 9 samples of w(n) and with a cutoff frequency of 1.2 radians / sec. | | CO3 | 15 |
| b. | Draw the linear phase realization structure of  h[n]= {1/4,1/2,3/4,1/2,1/4} | | CO3 | 05 |
| **(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. | | CO3 | 15 |
| b. | State the effect of quantization on different representation of binary numbers. | | CO4 | 05 |
|  | | **Compulsory**: | |  |  |
| 9. | a. | Draw the various blocks in the Harvard architecture and clarify them in detail. | | CO5 | 10 |
| b. | Derive the Wiener-Hopf equation and explain basic wiener filter theory in detail. | | CO6 | 10 |