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

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

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| **Code : 17EC3063** |  | **Duration :** | **3hrs** |
| **Sub. Name : ADVANCED 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. | Classify the various types discrete time signals; sketch and mathematically represent them with examples where ever possible. | CO1 | 12 |
| b. | Find the Linear and circular convolution of the sequences x(n) and h(n) where x(n)={1,0.5} and h(n)={0.5,1}. | CO2 | 4 |
| c. | Illustrate any one application of DSP with a neat diagram. | CO1 | 4 |
| (OR) | | | | |
| 2. | a. | Explain about analog to digital conversion with relevant diagrams. | CO1 | 5 |
| b. | Determine the response of the LTI system whose input x(n) and impulse response h(n) are given by, x(n)={1,2,0.5,1} and h(n)={1,2,1,-1}  ↑ | CO2 | 8 |
| c. | Test the linearity of the following systems given as  (i) y (n)=B x(n)+C (ii) y(n)=n x(n) | CO2 | 3 |
| d. | Test if the following systems are causal or non causal  i. y (n) = x (n) – x (n – 1)  ii. y (n) = a x (n) | CO2 | 4 |
|  |  |  |  |  |
| 3. | a. | Determine the 4-point DFT of the sequence | CO4 | 5 |
| b. | State and Prove any five properties of Z-Transform. | CO3, CO4 | 10 |
| c. | In an LTI system the input x(n) = {1,2, 3} and the impulse response h(n) ={-1,-1}. Determine the response of LTI system by radix-2 DIF method. | CO3 | 5 |
| (OR) | | | | |
| 4. |  | Compute eight point DFT of a sequence  x (n) = {0,1, 2, 3, 4, 5, 6, 7 } using DIF algorithm. | CO4 | 20 |
|  |  |  |  |  |
| 5. | a. | Explain the design procedure involved in designing a low pass digital Chebyshev filter. | CO3, CO4 | 6 |
| b. | For the analog transfer function, **Ha(s) =**  , determine H (z) if (i) T=1 sec and (ii)T=0.1sec and (iii)T=0.1sec using bilinear transformation. | CO3, CO4 | 12 |
| c | Sketch the mapping of s-plane to z-plane in bilinear transformation. | CO3, CO4 | 2 |
| (OR) | | | | |
| 6. |  | Obtain the direct form I, direct form II, Cascade and Parallel realization of the LTI system governed by the equation. | CO4 | 20 |
|  |  |  |  |  |
| 7. | a. | What is meant by Optimum equiripple design criterion? Why it is followed? | CO3 | 5 |
| b. | Write the procedure for FIR filter design by frequency sampling method. | CO3 | 5 |
| c. | Compare the Hamming window and Kaiser window. | CO4 | 5 |
| d. | Compare IIR and FIR filters. | CO3 | 5 |
| (OR) | | | | |
| 8. |  | Design an Low Pass Filter using rectangular window if N=9 whose desired frequency response is   1. Determine the impulse response 2. Determine H(z) | CO3 | 20 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Summarize in detail about Multirate signal processing. | CO5, CO6 | 5 |
| b. | Explain polyphase decomposition for FIR and IIR filter structure in detail. | CO5, CO6 | 15 |