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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**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. | Convolve the following two sequences using   1. Linear convolution 2. Circular convolution 3. Linear convolution through circular convolution     And also write your inference on the three results. | CO1 | 16 |
| b. | Find the 4-point DFT of the sequence | CO1 | 4 |
| (OR) | | | | |
| 2. | a. | Find circular convolution of  and by any two approach. | CO1 | 5 |
| b. | Perform sectioned convolution using overlap add method for the given sequences, and . | CO1 | 15 |
|  |  |  |  |
| 3. | a. | Find the 8-point DFT of the sequence  using radix – 2 DIF FFT algorithms. | CO1 | 16 |
|  | b. | Draw the radix-2 DIF FFT butterfly diagram for an 8 point sequence. | CO1 | 4 |
| (OR) | | | | |
| 4. | a. | State the twiddle factors associated with 4-point FFT algorithm. | CO1 | 5 |
|  | b. | Determine the 8-point DFT of sequence, 0 ≤ n ≤ 7 using DIF FFT algorithm. | CO1 | 15 |
|  |  |  |  |  |
| 5. |  | Design a Butterworth digital IIR filter using the impulse variance method for the followingspecifications: |  |  |
|  | a. | Compute order and analog cutoff frequency of the above filter | CO2 | 6 |
|  | b. | Compute transfer function of the above filter, Assume T = 1 sec. | CO2 | 10 |
|  | c. | Show that FIR filter with h[n] = {1/4,1/2,3/4,1/2,1/4} is a linear phase filter and also draw the linear phase realization structure of the filter. | CO2 | 4 |
| (OR) | | | | |
| 6. | a. | Using bilinear transformation, design a digital Butterworth filter with –3dB cut-off at 0.45π rad/sample and an attenuation of 10dB at 0.6π rad/sample. | CO2 | 14 |
|  | b. | Use Impulse invariance technique to obtain H[z] for the analog transfer function . Assume T= 1sec. | CO2 | 6 |
|  |  |  |  |  |
| 7. | a. | Determine the coefficient h (n) of a linear phase FIR filter with length N=11 using the frequency sampling method.    and draw the transversal realization of h(n). | CO2 | 10 |
|  | b. | Discuss about the input quantization error with an example. | CO3 | 10 |
| (OR) | | | | |
| 8. | a. | Design a linear phase FIR digital filter for the given specifications using Hamming window of length N=7.    and find Z transform of h(n). | CO2 | 10 |
|  | b. | Specify about the signal scaling to prevent overflow limit cycle in the second order digital filter implementation. | CO3 | 10 |
|  |  |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Draw the various blocks in the Harvard architecture and clarify them in detail. | CO3 | 10 |
|  | b. | State the steps of Least Mean Square algorithm in detail. | CO3 | 10 |

ALL THE BEST