| PRN: | | Course Code : | ECE301R1 |
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Third Year **B. Tech** End Semester Examination Winter 2023

# Digital Signal Processing

Day and Date: wednesday, 29/11/2023 Max Marks: **100**

Time : 10.30 am to 1.30 PM Duration: **03** hrs

Instructions: All questions are compulsory.

| | | | Marks | Bloom's Level | CO |
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| Q.1 | | **Attempt the following** | | | |
| | a) | State and explain properties of DFT. | 08 | 2 | 1 |
| | b) | Determine y(n)=x(n)*h(n) for given sequence, x(n)=(1,2,-1,2,3, -2,-3,-1,1,1,1,2,-1) & h(n)=(1,2) using overlap add method. | 08 | 3 | 1 |
| | | OR | | | |
| | b) | Compute circular convolution for h(n)={1,1,2,1} and x(n)={1,2,3,4} using concentric circle method. | 08 | 3 | 1 |
| Q.2 | | **Attempt the following** | | | |
| | a) | Explain DIT-FFT algorithm. | 08 | 2 | 2 |
| | b) | Determine DFT of the sequence, x(n)={1,2,3,4,4,3,2,1) using DIT-FFT algorithm. | 08 | 4 | 2 |
| | | OR | | | |
| | b) | Determine 4-point DFT of a sequence, x(n)={0,1,2,3} using DIT -FFT algorithms. | 08 | 4 | 2 |
| Q.3 | | **Attempt any two from the following** | | | |
| | a) | Explain windowing method used in FIR filter design and give any two window functions. | 08 | 2 | 3 |
| | b) | Design a low pass FIR filter with 11 coefficients for the following specifications: Pass band edge frequency- 0.25 KHz, Sampling frequency- 1KHz, Use rectangular window. | 08 | 5 | 3 |
| | c) | Explain frequency sampling method of FIR filter design. | 08 | 2 | 3 |
| Q.4 | | **Attempt any two from the following** | | | |
| | a) | What is bilinear transformation? Explain frequency warping and pre-warping procedure in BLT. | 08 | 2 | 3 |
| | b) | For the analog transfer function H(s) = 1/(s+1) (s+2), determine H(z) using impulse invariant technique, Assume T= 1 sec. | 08 | 5 | 3 |
| | c) | Apply Bilinear Transformation to H(s) = 2/(s+1) (s+2) with T=1 sec. and find H(z). | 08 | 3 | 3 |
| Q.5 | | **Attempt any Two of the following** | | | |
| | a) | State realization structures of FIR filter. Explain cascade form realization in detail. | 09 | 2 | 4 |
| | b) | Explain direct form structure of FIR system and Determine direct form realization of system function given below: $H(z)=1+2z^{-1}-3z^{-2}-4z^{-3}+5z^{-4}$ | 09 | 4 | 4 |
| | c) | State realizations of IIR filter. Explain any one in detail. | 09 | 2 | 4 |

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| Q.6 | **Attempt any Two of the following** | | | | |
| | a) | Illustrate Digital processing of Audio Signals as application of DSP. | 09 | 2 | 4 |
| | b) | Describe DSP system with block diagram. | 09 | 2 | 4 |
| | c) | Illustrate Radar signal processing as application of DSP. | 09 | 2 | 4 |

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