

Roll No. \_\_\_\_\_

**22663**

**M. Tech. 1st Semester (ECE)**

**CBCS Scheme**

**Examination – February, 2022**

**ADVANCED DIGITAL SIGNAL PROCESSING**

**Paper : MTECE21C4**

**Time : Three Hours ]**

**[ Maximum Marks : 100**

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Attempt *five* questions in all, selecting *one* question from each Unit. Question No 1 is compulsory. All questions carry equal marks.

- 1.** (a) Explain discrete time system. **5 × 4 = 20**
- (b) Differentiate between linear convolution and circular convolution.
- (c) Explain BIBO condition.
- (d) Compare the fixed point and floating arithmetic.
- (e) Explain Gibbs oscillations.

**UNIT - I**

2. (a) Discuss the classification of systems. 10  
 (b) Determine the impulse response  $h(n)$  for the system described by second order difference equation,  
 $y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1)$  10
3. (a) Explain the process of reconstruction of the signal from its samples. Also explain aliasing effect and how it is minimized. 10  
 (b) Find the Fourier transform of  
 $f(t) = \sin(\omega_c t + \theta)$  10

**UNIT - II**

4. Compute the circular convolution of two sequences. 20  
 $x(n) = \{1, 2, 1, 1\}$  and  $h(n) = \{1, 2, 3, 1\}$
5. (a) Compute the N-point DFT of  $x(n) = a^n$  for  $0 \leq n \leq N-1$  10  
 (b) Find the z-transform of  $x(n) = a^n \cos \omega_0 n$ . 10

**UNIT - III**

6. Discuss the various window techniques for design of FIR filter. 20
7. (a) Design digital high pass butter worth filter for cut off frequency is 40 Hz and sampling frequency is 200 Hz. 10  
 (b) Explain digital frequency transformation. 10

**UNIT - IV**

8. (a) Explain the effect of finite word length on digital filters. Also explain truncation and round off processes in binary number representations. 15  
 (b) Explain sampling theorem. 05
9. Draw the structures of direct form 1, direct-2, cascade and parallel realizations of

$$H(z) = \frac{(1 - z^{-1})^2}{\left(1 - \frac{1}{2}z^{-1}\right)\left(1 - \frac{1}{8}z^{-1}\right)}$$