

Roll No. ....

**22145**

**M. E. 1st Semester  
(Electronics & Communication Engg.)  
Examination – January, 2012**

**ADVANCED DIGITAL SIGNAL PROCESSING**

**Paper : MEEC-507**

***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 any *five* questions. All questions carry equal marks.

1. (a) Give the classification of system with example. 10
- (b) Determine the range of values 'a' and 'b' for which the LTI system : 10

$$h(n) = \begin{cases} a^n & \text{for } n \geq 0 \\ b^n & \text{for } n < 0 \end{cases} \text{ is stable.}$$

2. Find out the Fourier Transform of RF triangular pulse. 20

3. (a) Determine the Z-transform of the sequence. 10

$$x(n) = \begin{cases} 2^n & \text{for } n < 0 \\ \left(\frac{1}{2}\right)^n & \text{for } n = 0, 2, 4, 6, \dots \\ \left(\frac{1}{3}\right)^n & \text{for } n = 1, 3, 5, 7, \dots \end{cases}$$

(b) Give the properties of DFT. 10

4. What is Gibbs Phenomenon ? How is it overcome ?  
Derive the equations for rectangular window. 20

5. Perform the Circular Convolution of two sequences :20

$$x(n) = [2, 2, 1, 1] \text{ and } h(n) = [4, 3, 2, 1]$$

6. (a) Design an IIR digital filter using impulse invariant method. 10

(b) What is the effect of finite word length in filters ?  
10

7. Draw the structures of Direct form 1, Direct form 2, Cascade and Parallel realizations of : 20

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

8. Explain : 10 × 2 = 20

- (a) Bilinear Transformation Method for IIR filter design.
- (b) Magnitude response of FIR filters.
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