

Roll No. ....

2404

B. E. 7th Semester (ECE)  
Examination – December, 2013

DIGITAL SIGNAL PROCESSING

Paper : EE-407-E

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.*

1. (a) Discuss the classifications of signals with examples. 10  
(b) State and prove Parseval's Energy theorem. 10
2. (a) Find the Fourier transform of  $f(t) = e^{|at|} \cdot \cos bt$ . 10  
(b) Determine signal energy and signal power for  $f(t) = e^{2t} \cdot u(t)$ . 10
3. (a) Discuss with examples, classification of systems. 10  
(b) Differentiate between FIR and IIR filters. 10

4. (a) Explain the process of reconstruction of the signal from its samples. Also explain aliasing effect and how is it minimised. 15

(b) Discuss sampling theorem. 5

5. (a) Find the z-transform of: 10

$$x(n) = r^n \cos(n\theta) \cdot u(n)$$

(b) Find the Inverse z-transform of the system function: 10

$$x(z) = \frac{z+1}{(z+0.2)(z-1)} \quad |z| > 1$$

6. (a) Differentiate between analog and digital filters. 8

(b) Discuss the different design techniques of digital filters. 12

7. (a) Obtain the cascade and parallel realization for the system function is given by: 10

$$H(Z) = \frac{(1 + \frac{1}{3} Z^{-1})}{\left(1 + \frac{1}{2} Z^{-1}\right) \left(1 + \frac{1}{2} Z^{-1} + \frac{1}{4} Z^{-2}\right)}$$

(b) Determine the direct form I and direct form-II realization for a 3rd order IIR transfer functions: 10

$$H(z) = \frac{3 + 3.6z^{-1} + 0.6z^{-2}}{1 + 0.1z^{-1} - 0.2z^{-2} + 0.3z^{-3}}$$

**8. Write short notes on any two of the following :**

(a) Multistage decimeter and interpolators.

(b) Digital filter banks.

(c) Application of DSP.