

Roll No .....

**EI/IC - 402****B.E. IV Semester**

Examination, June 2016

**Signals and Systems****Time : Three Hours****Maximum Marks : 70**

- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.  
 ii) All parts of each question are to be attempted at one place.  
 iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.  
 iv) Except numericals, Derivation, Design and Drawing etc.

1. a) Define Continuous time. Discrete time and digital signals.  
 b) What is condition for a system to be causal?  
 c) State sampling theorem and explain its importance.  
 d) Find the unit impulse response and unit step response of the following system.

$$y(n) = -1/4y(n-1) - 1/6y(n-2) + x(n) + 1/3x(n-1)$$

Or

Show that  $h(n)$  is equal to the convolution of the following signals

$$x(n) = \delta(n) + \delta(n-1)$$

$$y(n) = (1/2)^n u(n)$$

2. a) Differentiate between complex and trigonometric fourier series.  
 b) Find Fourier transfer of unit step function.  
 c) Find the continuous time Fourier transform of  $x(t) = u(t)\sin wt$ .

- d) State and prove the time integration property of fourier transform.

Or

For the continuous time periodic signal  $x(t) = 2 + \cos(2\pi t/3) + 2\sin(5\pi t/3)$ . Determine the fundamental frequency and the Fourier series coefficient.

3. a) Show that  $\delta(n) = n(n) - u(n-1)$ .  
 b) Define Circular symmetric of a sequence in DFT.  
 c) Find Fourier transform of  $x(n) = (1/2)^n u(n)$ .  
 d) Find the inverse DFT of  $X(k) = \{1, 2, 3, 4\}$

Or

State and prove time scaling and multiplication properties of fourier series.

4. a) State Dirichlet's conditions.  
 b) What is the physical significance of ROC in Z-transform?  
 c) Find out the Z-transform for the following discrete time sequence  $x(n) = kn^2, n \geq 0$ .  
 d) Find Z-transform of the following discrete time sequences.  $X(n) = \sin(n\omega T), n = 0, 1, \dots$

Or

Obtain inverse Z-transform using partial fraction expansion method where  $X(z) = 1/(z-1)(z-3)$

5. a) Define deterministic and random signals.  
 b) What is Gaussian noise?  
 c) Explain the concept of transformation of random variables.  
 d) Write short note on autocorrelation and cross-correlation.

Or

Write short note on correlation method of spectrum analysis.