

GUJARAT TECHNOLOGICAL UNIVERSITY**B. E. Sem. - V - Examination – June- 2011****Subject code: 150303****Subject Name: Signal and Systems****Date: 24/06/2011****Time: 10:30 am – 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Give classification of signals with examples 07
 (b) Sketch the following signals:
 (i) $u(-t+1)$ 02
 (ii) $-2u(t-1)$ 02
 (iii) $3r(t-1)$ 03

- Q.2** (a) How do you get the response of a Linear time invariant system to a step input signal? 07
 (b) Find whether the following systems with impulse response $h(t)$ are stable or not .
 (i) $h(t) = 1/RC e^{-t/RC} u(t)$ 02
 (ii) $h(t) = e^{-2|t|}$ 02
 (iii) $h(t) = te^{-t} u(t)$ 03

OR

- (b) Find the convolution of $x_1(t)$ and $x_2(t)$ for the following signals:
 (i) $x_1(t) = e^{-at} u(t)$; $x_2(t) = e^{-bt} u(t)$ 04
 (ii) $x_1(t) = tu(t)$; $x_2(t) = u(t)$ 03

- Q.3** (a) What do you mean by discrete convolution. Give the properties of convolution. 07
 (b) Find the convolution of the following signals:
 (i) $x(n) = \cos \pi n u(n)$; $h(n) = (1/2)^n u(n)$ 03
 (ii) $x(n) = (1/2)^n u(n)$; $h(n) = u(n) - u(n-10)$ 04

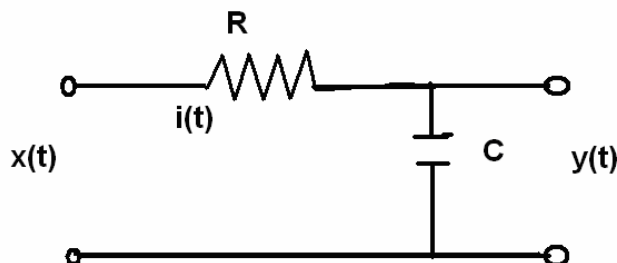
OR

- Q.3** (a) Give some properties of Z transform. 07
 07
 (b) Determine the z-transform and ROC of
 (i) $\delta(n-1)$ 04
 (ii) $\delta(n+1)$ 03

- Q.4** (a) State and prove Cauchy residue theorem. 07
 (b) Find the Fourier transform of $x(t) = 1 - e^{-|t|} \cos \Omega_0 t$ 07

OR

- Q.4** (a) Briefly explain relation between Z transform and Laplace transform. 07
 (b) Find the impulse response of the system shown below using Laplace transform.. 07



- Q.5 (a)** State and prove sampling theorem graphically. **07**
- (b)** Find 4 point DFT of
- (i) $x(n) = \{ 1, -2, 3, 4 \}$ Start from 1 **04**
- (ii) $x(n) = \sin(n\pi/2)$ **03**
- OR**
- Q.5 (a)** Explain system model with description of input output. **07**
- (b)** Find the Z transform of
- (i) $x(n) = na^n u(n)$ **04**
- (ii) $x(n) = n^2 u(n)$ **03**
