Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– V • EXAMINATION – WINTER 2016

Subject Code: 150303 Date: 19/11/2016
Subject Name: Signals & Systems
Time: 10:30AM – 01:00PM 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)** Explain different types of signals with example. **07**

(b) What is signal shifting and time reversal? Explain it with examples. **07**

Q.2 **(a)** Explain the term "System" and classify the systems on basis of its properties. **07**

(b) Determine which of the systems are linear and which are non-linear. **07**

1. $dy/dt + 6y(t) = f(t)$
2. $dy/dt + t^2y(t) = (3t+9)\, f(t)$

OR

(b) If $x[k]u[k] \leftrightarrow X[z]$, then prove the following: **07**

1. $x[k-1]\, u[k-1] \leftrightarrow 1/z\, F[z]$
2. $\gamma^k x[k]\, u[k] \leftrightarrow X[z/\gamma]$
3. $k\, x[k]\, u[k] \leftrightarrow -z\, d/dz\, \{X[z]\}$

Q.3 **(a)** Sketch the following signals: **07**

1. u(-t+4)
2. -4u(t-1)
3. 5r(t-1)

(b) What do you mean by discrete convolution.Give the properties of convolution. **07**

OR

Q.3 **(a)** Determine the Z transform and ROC of **07**

1. u(n-1)
2. u(n+1)

(b) State and prove Cauchy residue theorem. **07**

Q.4 **(a)** Find the Fourier transform of $x(t) = 1 - e^{-|t|} \cos \Omega 0t$ **07**

(b) Find the Z_transform: **07**

1. sin(an)u(n)
2. $-a^n u(-n-1)$

OR

Q.4 **(a)** Enlist and explain the properties of Fourier transform. **07**

(b) What is signal reconstruction? Which are the difficulties faced during signal reconstruction? **07**

Q.5 **(a)** Explain DIF FFT algorithm. **07**

(b) Find 4 point DFT of x(n) ={ 1, 2, 3,-4} **07**

OR

Q.5 **(a)** Explain any seven properties of Z_transform in brief. **07**

(b) Find the Z transform of $x(n) = nb^n u(n)$ **07**

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