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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