

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER V • EXAMINATION – WINTER - 2012****Subject code: 150303****Date: 17-01-2013****Subject Name: Signal & Systems****Time: 02:30 pm to 05:00 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) Explain the term “System” and classify the systems on basis of its properties? 07
 (b) Define the term “Total Response” of systems and derive general equation to obtain Zero State response for Linear Time Invariant Continuous Systems? 07
- Q.2 (a) Define the term “Eigen Value” of system and derive general equation to obtain Eigen values for Linear Time Invariant Discrete Systems? 07
 (b) Explain with the suitable example following signal operations (i) Time Shifting, (ii) Time Scaling and (iii) time reversal 07
- OR**
- Q.3 (b) Sketch and explain standard Discrete-Time signal models? 07
 (a) Explain with the help of block diagram digital signal processing of analog signals? 07
 (b) Obtain Z-transform and draw ROC of the following sequence 07
- i) $x(n) = \left(\frac{1}{2}\right)^n u(n) + \left(-\frac{1}{3}\right)^n u(n)$
 ii) $x(n) = \left(-\frac{1}{3}\right)^n u(n) + \left(-\frac{1}{2}\right)^n u(-n-1)$
- OR**
- Q.3 (a) Enlist the properties of Z-transform and prove any three properties mathematically? 07
 (b) Determine impulse response $h(n)$ for the system describe by difference equation $y(n)-3y(n-1)-4y(n-2)=x(n)+2x(n-1)$ 07
- Q.4 (a) Explain the frequency response on basis of system transfer function $H[z]$ 07
 (b) Obtain the sequence $x(n)$ for following 07
- i) $X(z) = \frac{1}{\left(1-\frac{1}{4}z^{-1}\right)\left(1-\frac{1}{2}z^{-1}\right)}$ for $|z| > \frac{1}{2}$
 ii) $X(z) = \frac{1}{(1-az^{-1})}$ for $|z| > |a|$
- OR**
- Q.4 (a) Explain the phenomena of signal reconstruction and also discuss difficulties associated with signal reconstruction? 07
 (b) Obtain canonic direct and transposed canonic realization of following Transfer Functions 07
- (i) $\frac{9}{s+25}$ (ii) $\frac{s}{s+2}$ (iii) $\frac{s+2}{s^2+8s+7}$
- Q.5 (a) Enlist and explain properties of Fourier Transform? 07
 (b) i) Enlist application of Fourier Transform? 03
 ii) Compute Fourier Transform of $x[n] = (1)^n u(n)$ 04
- OR**
- Q.5 (a) Explain how FFT is more computational efficient compared to DFT? 07
 (b) i) Enlist the properties of Discrete Fourier Transform 04
 ii) Compute four point DFT $x(n)=\{0,1,2,4\}$ starting from 0 03
