# GUJARAT TECHNOLOGICAL UNIVERSITY
## BE - SEMESTER–VII • EXAMINATION – SUMMER 2014

**Subject Code: 170804**
**Subject Name: Discrete Time Signal Processing**
**Time:02:30 pm to 05:00 pm**

**Date: 29-05-2014**

**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) What are the advantages of DSP over ASP?　07
　　 (b) Explain classification of system.　07

Q.2 (a) Define ROC and explain its properties for the z-transform　07
　　 (b) Prove the following properties of Fourier transform.　07
　　　　1) Time shifting
　　　　2 )Convolution
　　　　3 )Frequency shifting

**OR**

　　 (b) Obtain the trigonometric Fourier series of triangular waveform, having an　07
　　　　amplitude + A at T/ 2 and –A at –T/2.

Q.3 (a) Perform convolution of given sequence　07
　　　　$h(n)=\{1,1,0,1,1\}$, $x(n) = \{1,-2,-3,4\}$

　　 (b) Find Inverse z-transform using partial fraction method:　07
　　　　$H(Z) = \dfrac{-4+8Z^{-1}}{1+6Z^{-1}+8Z^{-2}}$,

**OR**

Q.3 (a) Determine the Z-transform of　07
　　　　( i)$2^n u(n-2)$　(ii) $n^2 u(n)$　(iii) $\cos\omega n$
　　 (b) Find Inverse z-transform using Residue method:　07
　　　　$X(Z) = \dfrac{1}{(Z-0.25)(Z-0.5)}$

Q.4 (a) Find IDFT of $X(k)=\{3,(2+j),1,(2-j)\}$　07
　　 (b) Given $X(n)= \{0,1,2,3,4,5,6,7\}$, find $X(k)$ using DIT-FFT algorithm.　07

**OR**

Q.4 (a) Determine the DFT of the sequence $x(n)=(1/4, 1/4 , 1/4 )$　07
　　 (b) Differentiate between decimation- in- time FFT and decimation- in-frequency　07
　　　　FFT algorithm.

Q.5 (a) Discuss various steps for design FIR digital filter using Kaiser window.　07
　　 (b) Discuss bilinear transformation technique for IIR digital filter design.　07

**OR**

Q.5 (a) Find H(z) By using bilinear transformation method　07
　　　　Where, $H(s)= \dfrac{z}{(s+1)(s-3)}$ and $T = 0.1$ sec
　　 (b) Discuss the stability of the impulse invariant mapping technique.　07

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