

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-VI Examination-Nov/Dec-2011

Subject code: 160305**Date: 30/11/2011****Subject Name: Bio-Medical Signal Processing****Time: 10.30 am -1.00 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 advantages of Digital signal processing over analog signal processing. **07**

(b) Explain adaptive cancelling of Maternal ECG in Fetal ECG. **07**

Q.2 (a) Define Signal. Give classification of signals and explain any two in detail with example. **07**

(b) A discrete time signal $x(n) = \{1, -1, 2, 0, 1\}$, Sketch following signals. **07**

(a) $x(n-2)$ **(b)** $x(2-n)$ **(c)** $x(n)u(2-n)$

OR

(b) Explain characteristics of Continuous and Discrete time signal. **07**

Q.3 (a) What is system? Give classification of systems. Explain any two systems with example. **08**

(b) Which of the following systems are Causal LTI systems? Justify. **06**

1) $y[n] = x^2[n] + 5$

2) $y[n] = x[2n]$

3) $y[n] = |x[n]|$

OR

Q.3 (a) Design first order digital bandstop IIR filter that meets the following specifications: Lower cutoff frequency is 210Hz, Upper cutoff frequency is 330Hz, Sampling frequency 960 sample per second. **07**

(b) Design an FIR low pass filter to meet the following specifications: **07**
Pass band edge frequency = 1.5 KHz, Transition width = 0.5 KHz,
Stop band attenuation 50db, sampling frequency 1 KHz. Use hamming window.

Q.4 (a) Compute the 4 point DFT of $x[n] = \{1, 0, 0, 1\}$. **06**

(b) Explain following properties of Discrete Fourier transform **08**

- Time reversal of Sequence
- Periodicity

OR

Q.4 (a) Perform linear convolution of given sequence using DFT. **09**
 $x[n] = \{1, 2, 0, 0\}$ and $h[n] = \{2, 1, 0, 0\}$

(b) Explain DFT property "Circular time shift of a Sequence". **05**

- Q.5** (a) Given sequence $x[n] = \{1, 2, 2, 1\}$. Find corresponding Discrete Fourier transform using Decimation in time FFT. **07**
- (b) Explain DSP application DTMF (Dual tone Multi frequency Signal Detection). **07**

OR

- Q.5** (a) Given sequence $x[n] = \{1, 2, 3, 4\}$. Find corresponding Discrete Fourier transform using Decimation in frequency FFT. **07**
- (b) Explain overview of DSP processor Texas Instrument's TMS320. **07**
