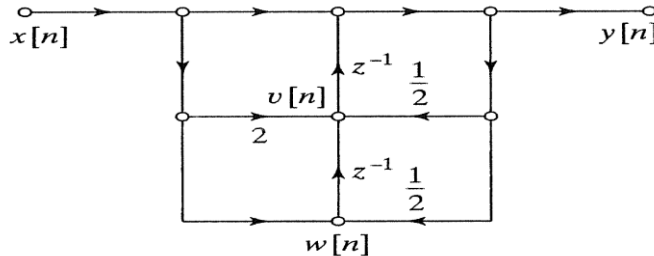
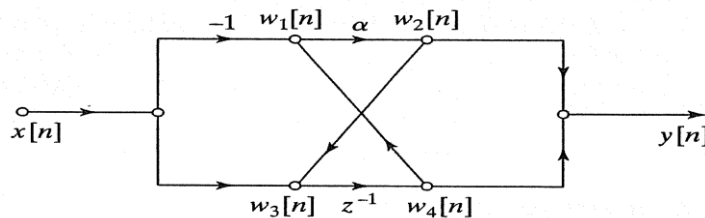


GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – WINTER • 2014****Subject Code: 160305****Date: 03-12-2014****Subject Name: Biomedical Signal Processing****Time: 02:30 pm - 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) Consider below given signal flow graph **07**

- 1) Using node variable indicated, write the set of difference equations represented by this network.
- 2) Draw the flow graph of an equivalent system that is the cascade of two first order systems.

(b) Enlist all type of systems. Explain any two with example. **07****Q.2 (a)** Determine the system's transfer function for below given Signal flow graph. **07****(b)** Draw and explain structures of linear phase FIR systems. **07****OR**

(b) Draw the frequency response and z plane for **07**

a single zero at $z = -1$ and pole at $z = 1$

a single pole at $z = -1$ and zero at $z = 1$

Q.3 (a) Determine digital filter using impulse invariance method for given $H(s)$, **07**

$$H(s) = \frac{(s+2)}{(s+1)(s+3)}$$

(b) Obtain the coefficients of an FIR low pass filter to meet the following **07**

specifications using hamming window method

Stop band attenuation > 50 dB

Pass band edge frequency 3.4KHz

Transition width 0.6 KHz

Sampling frequency 8KHz

OR

- Q.3 (a)** Transfer function of simple RC circuit LPF can be given by $H(s) = 1/(s+1)$ and its bandwidth is known to be 1 rad/sec. use BZT method to design digital filter whose bandwidth is 20 Hz at sampling frequency 60 sps. **07**
- (b)** Obtain the coefficient of FIR low pass filter using window method **07**
 Passband edge frequency 1.5Khz
 Transition width 0.5Khz
 Stopband attenuation 750db
 Sampling frequency 8Khz.
- Q.4 (a)** Prove that convolution of two sequences in time domain is equal to multiplication in frequency domain. **07**
- (b)** Find the 4 point DFT of sequence $x(n) = \{1 \ 2 \ 2 \ 1\}$. **07**
- OR**
- Q.4 (a)** Explain circular shift of a sequence in DFT. **07**
- (b)** Differentiate between continuous, discrete and digital signals with necessary schematics. **07**
- Q.5 (a)** Explain GOERTZEL algorithm. **07**
- (b)** Explain generalized architectures of DSP processors. List applications of DSP processors. **07**
- OR**
- Q.5 (a)** For the given $x[n] = \{1 \ 2 \ 3 \ 0\}$ sequence find corresponding 4 point DFT using DIT FFT. **07**
- (b)** Discuss the process of ECG analysis for arrhythmia detection. **07**
