B.TECH. IN ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

### June, 2013

BIELE-014 : MULTIRATE SYSTEMS

Time : 3 hours *Maximum Marks : 70*

Note : *Answer **any seven** questions. Each question carries **equal** marks.*

1. (a) What are Multirate Systems ? What is the requirement of mutirate signal processing for digital systems ? **5**

   (b) Discuss the sampling theorem, also state the Nyquist criterion for it. **5**

2. (a) Write short note on sampling rate conversion with its application on digital systems. **5**

   (b) Obtain the decimated signal $y(n)$ by a factor 3 from the input signal $x(n)$. **5**

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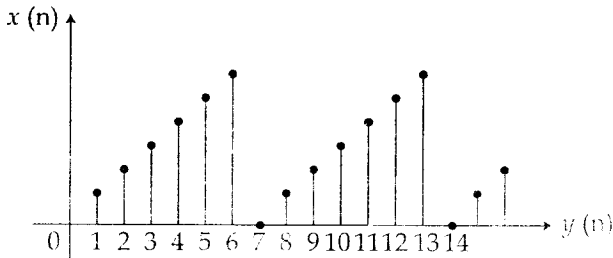
3. Obtain the polyphase decomposition of the IIR **10**
system with transfer function.

$$H(Z) = \frac{1 - 4Z^{-1}}{1 + 5Z^{-1}}$$

4. Discuss two channel Quadrature mirror filter **10**
bank with detailed analysis.

5. Design alias free QMF Filter bank, emphasize on **10**
direct realisation and computationally efficient
reatisation.

6. Explain the filter banks with equal passbands and **10**
unequal passband width.

7. Explain the polyphase decomposition for : **10**
   (a) FIR filter structure and
   (b) IIR filter structure

8. Explain frequency domain and time domain **10**
characteristics for Interpolation filters and
Decimation filters.

9. (a) List and explain the errors which arise due **5**
to quantisation process.
   (b) Obtain an expression for the variance of the **5**
round - off quantisation noise.