H.T.No. | | | | | | | | | | |

**Code No: EC1902** **GEC-R14**

## M. Tech I Semester Supplementary Examinations, February 2018

### ADVANCED DIGITAL SIGNAL PROCESSING

(Common to Digital Electronics and Communication Systems and Embedded Systems)

**Time: 3 Hours** **Max. Marks: 60**

**Note:** Answer any **FIVE** questions. All Questions carry equal Marks.

**5 × 12 = 60M**

1. a) What is the need of multirate signal processing? Give few applications. (4M)
   b) Explain the interpolation process in time domain and frequency domain. (8M)
2. a) Explain the concept of polyphase decomposition of decimator and interpolator. (6M)
   b) Show that the QMF bank results in perfect reconstruction. (6M)
3. a) Explain the difference between forward prediction and backward prediction. (6M)
   b) Discuss the Welch method of Periodogram averaging. (6M)
4. a) Explain how FIR Wiener filter can be used for filtering and prediction. (6M)
   b) Derive the recursive predictor coefficients for optimum lattice predictor by Levinson-Durbin algorithm. (6M)
5. a) Explain how noise is cancelled adaptively using LMS algorithm. (6M)
   b) Explain in detail the RLS algorithm for direct FIR filter. (6M)
6. Show that the Bartlett estimate of the power special density is asymptotically unbiased that the variance of the estimate decreases with the number of data sections and the spectrum estimates are consistent. (12M)
7. a) Consider the ARMA process generated by the difference equation $x(n) = 1.6\, x(n-1) - 0.6\, x(n-2) + \omega(n) + 0.9\, \omega(n-1)$
      i) Determine the system function of the whitening filter and its poles and zeros.
      ii) Determine the power spectrum density of $\{x(n)\}$. (6M)
   b) Discuss the Blackman-Tukey method. (6M)
8. Explain the principle of parameter estimation and discuss how AR model parameters are estimated by Yule-walker method. (12M)

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