

**Advanced Digital Signal Processing**

**Important 13mark questions**

**Unit I**

1. The power spectrum  $S_x(\omega)$  of a WSS random process  $x(n)$  is given by

$$S_x(\omega) = \frac{25 - 24\cos\omega}{26 - 10\cos\omega}$$

Find the system function  $H(z)$  of a filter that produce white noise with unit variance at the output when the input is  $x(n)$ .

2. Explain Prony Method.

**Unit II**

1. Explain the following model-based approach:
  - (i) MA
  - (ii) ARMA
2. Compute the energy density spectrum of a finite sequence.

**Unit III**

1. Derive Yule-Walker equations for AR process and explain power spectrum estimating using AR model parameters.
2. Derive the Wiener-Hoff equations and find the solutions of Wiener-Hoff equations for linear transversal filters.

**Unit IV**

1. Explain the design of FIR filters based on windowing.
2. Explain LMS algorithms with neat diagram and relevant equations.

**Unit V**

1. With neat sketches, explain the time domain and frequency domain characteristics of a decimetre with a factor of D.
2. Derive the equation for exponentially weighted recursive least squared adaptive algorithm and explain.