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Question Paper Code:U1201

M.E. DEGREE EXAMINATION, APRIL 2024

First Semester

Communication Systems

21PCM101–ADAPTIVE SIGNAL PROCESSING

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

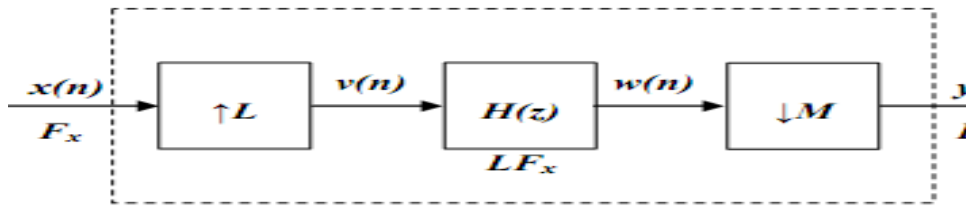
PART - A (5 x 20 = 100 Marks)

1. (a) Apply spectral factorization theorem to calculate its computation issues. CO2-App (20)

Or

- (b) Derive Wiener Khinchin theorem with proof and apply the theorem in signal processing. CO2- App (20)

2. (a) Analyze Multirate signaling concepts to derive sampling rate conversion by a rational factor I/D using the following figure. CO4- Ana (20)



Or

- (b) Analyze the frequency response of the decimation process with a factor of 'D' and with factor of $D/2$. Discuss the aliasing effect of both decimation process and justify your answers CO4- Ana (20)

3. (a) Apply and Derive the Wiener-Hopf equation for FIR Wiener filter and obtain the system function for smoothing applications. CO3- App (20)

Or

- (b) Apply the filtering concept to design a Wiener filter for Adaptive filtering and linear prediction CO3- App (20)

4. (a) How do you determine the coefficients of the MA(2) process that have the foregoing autocorrelation with any auto correlation sequence? CO3- App (20)

Is the solution unique? If not, give all the possible solutions.

Or

- (b) Determine the mean and the auto correlation of the sequence $x(n)$ generated by the MA(2) process described by the difference equation. CO3- App (20)

$$X(n) = w(n) - 2w(n-1) + w(n-2)$$

Where $w(n)$ is the white noise process with variance σ_w^2

5. (a) Explain the DSP techniques which are used in speech analysis and synthesis. CO1- U (20)

Or

- (b) Explain the multistage implementation of multi rate system and sub-band coding system CO1- U (20)