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FIRST SEMESTER **M.Tech.(SPDD)**

SUPPLEMENTARY EXAMINATION *(February 2019)*

EC-523 STATISTICAL MATHS AND WAVELET THEORY

Time: 3 Hours *Max. Marks : 100*

Note : Answer ***FIVE*** questions. Assume suitable missing data, if any.

1 (a) Define orthogonal wavelets. Give examples.
(b) Define biased and unbiased estimators.
(c) Write scaling equation.
(d) Define type I and type II errors for hypothesis testing.
(e) Define vanishing moments of wavelets. What does it represent?

2(a) Sate and prove perfect reconstruction condition of first stage wavelet basis.

2(b) Draw a p^{th}-stage analysis and synthesis phase of wavelet the analysis for both, recursive and nonrecursive stages. Also, find out output expressions of analysis and synthesis phase for both.

3 (a) (i) Find out the windowed Fourier transform of a sinusoidal wave $f(t) = \exp(i\xi_0 t)$. Also find out its energy spread interval.

3(b) Let X be normally distributed with mean μ and variance σ^2, where both μ and σ^2 are unknown. Use the maximum likelihood method to estimate μ and σ^2.

R-T-O

4(a) Let $N=2^n$ and $1 \leq p \leq n$, then derive the number of complex multiplications required to compute the output of the p^{th} stage wavelet filter bank.

4(b) Describe the hypothesis test on the mean of a normal distribution, variance unknown.

5 (a) What is nonparametric test? Compare the parametric and non - parametric tests. Describe rank test for homogeneity of Wilcoxon Mann and Whitney.

5 (b) Explain multiple linear regression and derive the matrix form of the least squares normal equations

6 Write short notes on following two:-

(a) Neville Aitken method

(b) Bezier curve