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# SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act,1956)

Course & Branch :M.E - W-AEL
Title of the Paper :Transforms and Probabilities — Max. Marks:80
Sub. Code :735101 (2008-09) — Time : 3 Hours
Date :02/12/2011 — Session :FN

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PART - A (6 x 5 = 30)

Answer ALL the Questions

1. State and prove any two properties of discrete Fourier transform.
2. Write the test statistic in testing whether the sample mean deviates significantly from the population mean, using T – distribution.
3. Define stochastic process and state its classification.
4. At a checkout counter customers arrive at an average of 1.5/min. Find the probabilities that
   (a) at most 4 will arrive in any given minute
   (b) At least 3 will arrive during an interval of 2 minutes
5. State the types of Queuing models with example.
6. Bring out the salient features of Binomial, Poisson and exponential distributions with classic examples.

PART – B (5 x 10 = 50)

Answer ALL the Questions

7. Write down the algorithm for Decomposition-in-time Fast Fourier Transform.

(or)

8. Give on application of the Z-transform to linear time invariant *(LTI)* systems.

9. State and prove any two properties of the continuous wavelet transform.

(or)

10. Find the scaling and wavelet coefficients of the function $y = x^2$, $0<x<1$ by taking the starting scale as $j_0 = 1$.

11. Given a $2^J \times 2^J$ image does a J+1 level pyramid reduce or expand the amount of data require to represent the image? What is the compression or expansion ratio?

(or)

12. Using the Haar Wavelet, determine the minimum entropy packet decomposition for the function f(n) = 0.25 for n=0,1,2 ……. 15. Employ the non-normalized Shannon entropy
$E[f(n) = \Sigma f^2(n) I_n [f^2(n)]$
As the minimization criterion. Draw the optimal trec, labling the nodes with the computed entropy values.

13. State and prove the properties of auto-correlation function.

(or)

14. Find the auto-correlation function corresponding to the power density spectrum $S_{xx}(w) = \frac{8}{(9+w^2)^2}$. Also find its mean and variance.

15. Write detailed notes on (a) Ergodicity, Mean – Ergodic processes
(b) Variance and Co- vaiance
Draw sketches and graphs where necessary

(or)

16. State Wiener – Khvichin relations. For a random process, X (t) = A cos (W+θ) where A is real constant, W is a random variable with density f(w) and θ is a random variable uniformly distributed over the interval $(-\pi,\pi)$ and independent of w, calculate the power spectral density.