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 Time : 3 Hours
Date :09/12/2009 Session :FN

PART - A (6 x 5 = 30)

Answer ALL the Questions

1. What is KL transform? State its Properties.

2. List the properties of Discrete Sine Transform.

3. What are the properties of Haar transform?

4. What are the criteria used for selecting transform for various applications?

5. A continuous random variable X has a probability density function $f(x) = 3x^2, 0 \leq x \leq 1$.
   Find 'a' such that $P[x \leq a] = p(x > a)$

6. The joint probability function of the two dimensional variable (x, y) of the form $f(x, y) - e^{-(x+y)}, x \geq 0, y \geq 0$ then find $P(x > 1)$.

PART – B (5 x 10 = 50)

Answer ALL the Questions

7. Define 2D – DFT pair and explain its properties.

(or)

8. Explain the Hadmard Transform.

9. 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 $E[f(n)] = \sum_n f^2(n) In[f^2(n)]$

as the minimization criterion. Draw the optimal tree, labeling the nodes with the computed entropy values.

(or)

10. Define wavelet transforms and explain about 1 D and 2D wavelet transforms.

11. Derive the moment generating function of Binomial distribution.

(or)

12. If the joint distribution function of x and y is given by $f(x, y)=1-e^{-x}-e^{-y}+e^{-(x+y)}; x>0, y>0 and =0$ else where Find the marginal densities of x and y.

13. Consider a random process x(t) definite by x(t) = U cos t + V sin t, where U and V are independent random variables each of which assumes the values -2 and 1 with probabilities $\frac{1}{3} and \frac{2}{3}$ respectively. Show that x(t) is wide-sense stationary and not strict – sense stationary.

(or)

14. State and explain PARSEVAL'S theorem.

15. Derive Pollack – Khin Chine formula.

(or)

16. A Super market has two girls ringing up sales counters. If the service time for each customer is exponential with mean 4 minutes and if people arrive in a Poisson fashion at the counter at the rate of 10 per hour, then calculate
(a) the probability of having to wait for service
(b) the expected percentage of idle time for each girl.
(c) If a customer has to wait, find the expected length of his waiting time.