SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act, 1956)

Course & Branch: M.E – Applied Electronics
Title of the paper: Transforms and Probabilities
Semester: I Max. Marks: 80
Sub.Code: 635101/735101(2008) Time: 3 Hours
Date: 10-12-2008 Session: FN

PART – A (6 x 5 = 30)

Answer All the Questions

1. State and prove any two properties of discrete Fourier transform.

2. Define continuous-time wavelet transform *(CWT)* and state the properties of *CWT* as an operator.

3. Define stochastic process and state its classification.

4. Let $\{X_n: n \geq 0\}$ be a sequence of random variables with mean zero and variance 1. Then show that it is a Wide Sense Stationary process.

5. State the types of Queuing models with example.

6. Derive the formula to find the expected number of customers waiting in the queue in (M/M/1) : (∞/FIFO)

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. Explain in detail about the Digital Filter Implementation of the Haar Wavelet Decomposition.

(or)

10. Explain briefly about Wavelet Packets.

11. State and prove the memory less property of exponential distribution.

(or)

12. If X and Y are independent Poisson variates, show that the conditional distribution of X given X + Y is binomial.

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. In a consultant company there are two consultants. If the service time for each client is exponential with mean 4 minutes and if people arrive at a poisson fashion at a rate of 10 per hour. Then calculate.

    (i) Probability of having to wait for the service.

    (ii) Expected percentage of idle time.

(or)

16. Train arrives at a yard in every 15 minutes and the service time is 10 minutes. If the capacity of the yard is limited to 4 trains. Find

    (a) Probability that the yard is empty.

    (b) The average number of trains in the system.