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M.E (ETRX) Sem. II  
Advanced Comm. Theory05/06/09  
11-3 P.M.  
BB-5823

Con. 3396-09.

( 3 Hours )

[ Total Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.  
 (2) Attempt **five** questions in **all**.  
 (3) Assume the **suitable** data if **necessary**.

1. (a) Describe three randomness properties that make pseudorandom signals appear to be random. 5
- (b) Describe diversity combining techniques. 5
- (c) Explain why R-S codes perform so well in a bursty-noise environment. 5
- (d) Describe the difference between equalizers that use a zero-forcing solution, and those that use a minimum mean-square error solution. 5
  
2. (a) Find the generator matrix G for a systematic (7, 4) cyclic code using generator polynomial  $g(x) = x^3 + x^2 + 1$ . Design an encoder for this code and verify its operation using the message vector (1 1 0 0). 10
- (b) Describe the Viterbi Algorithm for decoding of convolutional codes. 10
  
3. (a) What techniques can be used for mitigating the effects of frequency selective fading? What techniques can be used for mitigating the effects of fast fading? 10
- (b) What are the differences between Rician fading and Rayleigh fading? 10
  
4. (a) Describe linear equalization and its importance, with a neat sketch of linear transversal filter. 10
- (b) Describe convergence properties of LMS algorithm. 10
  
5. (a) Binary data at 9600 bit/s are transmitted using 8-ary PAM modulation with a system using a raised cosine roll-off filter characteristics. The system has a frequency response out to 2.4 KHz. 10
  - (i) What is the symbol rate?
  - (ii) What is the roll-off factor of the filter characteristics?
- (b) State and prove the Nyquist Criterion for a bandlimited channel with zero ISI. Explain the cause behind ISI. 10
  
6. (a) Explain the working of a FHSS transmitter and receiver with how do you achieve synchronization in FHSS technique. 10
- (b) Compare DSSS with FHSS. 10
  
7. Write detailed notes on the following any **two** :— 20
  - (a) Multicarrier Communication System
  - (b) Kalman Filter
  - (c) Optimum AWGN Receiver.