Code :RR310406

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III B.Tech I Semester(RR) Supplementary Examinations, May 2011
DIGITAL COMMUNICATION
(Electronics & Communication Engineering)

Time: 3 hours
Max Marks: 80

Answer any FIVE questions
All questions carry equal marks
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1. (a) Establish the principles of flat top sampling with neat schematics. Hence explain the phenomenon of aperture effect and equalization.
   (b) A TV Signal has a bandwidth of 4.5 MHz. Determine the sampling rate and sampling intervals for
      i. minimum sampling
      ii. 10% under sampling and
      iii. 20% over sampling.

2. (a) As applicable to analog pulse modulation systems, explain the significance of the terms -
      i. anti aliasing filter,
      ii. synchronization,
      iii. Bandwidth requirements of PAM and PAM-TDM signals.
   (b) How Synchronization is achieved in PAM System?

3. (a) Why the overall transfer function of the duo-binary filter is called as Half-cycle cosine function.
   (b) Give the Impulse response of the duo-binary filter and sketch the amplitude and phase response.

4. (a) Explain how eye patterns are used for monitoring the performance of base band PAM system.
   (b) What is the necessity of shaping transmitted signal spectrum.

5. (a) Explain how Companding reduces the amount of noise introduced by the transmission channel.
   (b) Find the maximum dynamic range for a linear PCM system using 16-bit quantization.

6. Compare the performance of SSB, DSB, AM, WBFM and PCM communication systems with reference to Bandwidth, signal to noise ratio and power.

7. (a) In a coherent FSK system, the signals S_1 (t) and S_2 (t) representing symbols 1 and 0, respectively are defined by S_1 (t), S_2 (t) = Ac Cos $[2\Pi(fc \pm \Delta f/2)t]$ $0 \le t \le T_b$ Assuming that $f_c > \Delta f$, show that the correlation co-efficient of the signals $S_1(t)$ and $S_2(t)$ is approximately given by

$$F = \int\limits_{0}^{T_b} \frac{S_1(t).S_2(t)\,dt}{S_1^2(t)\,dt} \approx Sin(2\Delta f T_b)$$

   (b) What is the minimim value of frequency shift Δf for which the signals$S_1(t)$ and $S_2(t)$ are orthogonal?
   (c) What is the value of Δf that minimizes the average probability of symbol error?
   (d) For the value of Δf obtained in part (c), determine the increase in E_b/N_0 required so that this coherent FSK system has the same noise performance as a coherent binary PSK system.

8. Consider a (7,4) linear code whose generator matrix is

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

   (a) Find all the code vectors of this code.
   (b) Find the parity check matrix for this code.
   (c) Find the minimum weight of this code
   (d) Show the error correction capability of this code.

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