Fifth Semester B.E. Degree Examination, December 2010
Analog Communication

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Explain the generation technique of an AM wave, using the square law modulator. **(10 Marks)**
   b. Explain the working of an envelope detector.   **(05 Marks)**
   c. The efficiency of AM wave is defined by $\eta = \dfrac{P_s}{P_t} \times 100$, where P_s is the power carried by the two sidebands and P_t is the total power of AM signal. Find the efficiency for $\mu = 0.5$.
                                                                                          (05 Marks)

2 a. Describe the generation of DSB-SC wave, using ring modulator.   **(10 Marks)**
   b. Explain the coherent detection of DSB-SC wave.   **(10 Marks)**

3 a. Derive the equations of SSB signal using Hilber transform.   **(10 Marks)**
   b. Explain the generation of SSB wave, using phase discrimination method, assuming single tone message signal.   **(10 Marks)**

4 a. Describe the generation technique of FM wave, suing direct method.   **(10 Marks)**
   b. Explain with relevant analysis how PLL is used for FM detection.   **(10 Marks)**

5 a. Briefly explain the following:
       i)   Axioms of probability   ii) Gaussian process
       iii) Auto correlation function   iv) Characteristic function   **(16 Marks)**
   b. If $y = g(x) = \cos x$, then find moment 'm', of the random variable y, where x is c.r.v. uniformly distributed in the interval $(-\pi, \pi)$.   **(04 Marks)**

6 a. Define the following:
       i)   Thermal noise   ii) Shot noise
       iii) Noise figure   iv) Equivalent noise temperature   **(12 Marks)**
   b. In a cascade connection of two two-port devices, the noise figure of first and second stages are 5 dB and 15 dB respectively. The available power gain of first and second stages are 12 dB and 10 dB respectively. Find the overall noise figure in dB.   **(08 Marks)**

7 a. Derive an expression for figure of merit of DSB-SC receiver.   **(08 Marks)**
   b. The carrier amplitude of 1 volt, rms is available at the input of envelop detector, along with the noise PSD of 10^{-3} watts/Hz. If the carrier is modulated to a depth of 100% and message B.W, W = 3.2 KHz, then determine $(SNR)_o$. Derive the relation used.   **(12 Marks)**

8   Write short notes on:
   a. FM stereo multiplexing   **(07 Marks)**
   b. Pre-emphasis and De-emphasis   **(07 Marks)**
   c. Vestegial sideband   **(06 Marks)**

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