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06EC53

Fifth Semester B.E. Degree Examination, June/July 2017
Analog Communication

Time: 3 hrs.

Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART - A

1 a. State and explain three properties of auto correlation function. **(10 Marks)**
   b. Define Joint probability density function. Prove that the total volume under the surface represented by the joint PDF is always 1. **(07 Marks)**
   c. State Central Limit Theorem. **(03 Marks)**

2 a. Describe the generation of AM wave using switching modulator with mathematical analysis. **(07 Marks)**
   b. Discuss the drawbacks of envelope detector. **(03 Marks)**
   c. A modulating signal m(t) is given by m(t) = cos 100t + 2 cos 300t :
      i) Sketch the spectrum of m(t)
      ii) Find and sketch spectrum of DSBSC signal 2m(t) Cos 1000t. **(10 Marks)**

3 a. List the properties of Hilbert transformer. **(04 Marks)**
   b. Explain the concept of Quadrature Multiplexing. **(08 Marks)**
   c. Let $S_u(t)$ denote the SSB wave obtained by transmitting only the upper side band and $\hat{S}_u(t)$ is its Hilbert Transform. Show that : **(08 Marks)**

$$m(t) = \frac{2}{A_c}\left[S_u(t)\cos 2\pi f_c t + \hat{S}_u(t)\sin 2\pi f_c t\right] \text{ and } \hat{m}(t) = \frac{2}{AC}\left[\hat{S}_u(t)\cos 2\pi f_c t - S_u(t)\sin 2\pi f_c t\right]$$

4 a. Describe the phase discrimination method of generating SSB waves. **(07 Marks)**
   b. Explain envelope detection of VSB-SC waves. **(07 Marks)**
   c. Explain the operation of Frequency Division Multiplexing. **(06 Marks)**

PART - B

5 a. Explain Direct method of generating FM. **(07 Marks)**
   b. Show that the spectrum of FM contains infinite number of sidebands. **(08 Marks)**
   c. A sinusoidal modulating waveform of amplitude 10V and a frequency of 1KHz is applied to an FM generator that has a frequency sensitivity constant of 40Hz/volt. Determine the
      i) Frequency deviation and   ii) Modulation index. **(05 Marks)**

6 a. With relevant analysis, explain the FM demodulation using PLL. **(06 Marks)**
   b. Discuss non linear effects in FM systems. **(04 Marks)**
   c. Explain the operation of FM stereo multiplexing and demultiplexing. **(10 Marks)**

7 a. Discuss the noise factor of amplifiers in cascade and obtain the Friss formula. **(10 Marks)**
   b. An amplifier 1 has a noise figure of 9dB and power gain of 15dB. It is connected in cascade to the other amplifier 2 with noise figure of 20dB. Calculate the overall noise figure for this cascade connection. **(10 Marks)**

8 Write short notes on :
   a. Pre-emphasis and de-emphasis of FM   b. Equivalent noise temperature.
   c. Thermal noise   d. Threshold effect. **(20 Marks)**

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