Fifth Semester B.E. Degree Examination, June/July 2013
Analog Communication

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1   a.   Derive the equations on the random experiment to find:
     i) Statistical average   ii) Correlation function   iii) Co-variance function.   **(10 Marks)**
    b.   Explain the properties of autocorrelation function and power spectral density.   **(10 Marks)**

2   a.   With the help of time domain and frequency domain diagrams, explain the AM process. Also derive the AM equation for the instantaneous amplitude of the modulated voltage.
                                                                          (14 Marks)
    b.   A sinusoidal carrier voltage is amplitude modulated as:
      $V_c = (1000 + 700 \cos 6000 \, \pi t) \cos 2000 \, K\pi t$.
      Find the unmodulated carrier voltage, modulating voltage, modulation index, LSB and USB frequencies and band width of the AM wave.   **(06 Marks)**

3   a.   Explain the advantages of SSB communication and calculate the power saving of a carrier which is modulated to 50%.   **(08 Marks)**
    b.   Write the circuit diagram and explain the phase discrimination method of generating SSB wave.   **(12 Marks)**

4   a.   With the help of diagrams, describe the concepts of vestigial sideband modulation and demodulation.   **(12 Marks)**
    b.   Give the comparison of amplitude modulation techniques.   **(08 Marks)**

PART – B

5   a.   Define the terms: i) Modulation index, ii) Band width and iii) Frequency deviation, in the case of frequency modulation.   **(04 Marks)**
    b.   A 90 MHz carrier is frequency modulated by a sinusoidal AF modulating signal. The highest carrier frequency reached is 90.05 MHz. Calculate: i) Frequency deviation, ii) Carrier swing and (iii) Lowest frequency reached.   **(06 Marks)**
    c.   Write the diagram and explain the indirect method of generating wideband FM.   **(10 Marks)**

6   a.   With the help of circuit diagram, explain the balanced slope detection of the FM wave.
                                                                            (09 Marks)
    b.   Write the circuit diagram and explain the phase locked loop working.   **(07 Marks)**
    c.   Compare AM and FM systems.   **(04 Marks)**

7   a.   Explain the following noise types and give mathematical expressions:
     i) Shot noise   ii) Thermal noise   iii) White noise   **(08 Marks)**
    b.   Derive the expressions for: **(12 Marks)**
     i) Noise figure   ii) Equivalent noise temperature   iii) Noise equivalent bandwidth.

8   a.   Discuss the noise in AM and FM systems.   **(10 Marks)**
    b.   Describe the pre-emphasis and de-emphasis in the FM.   **(10 Marks)**

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