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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belgaum)
Fourth Semester, B.E. - Electronics and Communication Engineering
Semester End Examination; June/July - 2015
Analog Communication Theory

Time: 3 hrs   *Max. Marks: 100*

Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each **Unit**.
  ii) Assume suitable missing data if any.

UNIT - I

1. a. Define Amplitude modulation and derive equation for AM wave.   6

   b. Define Hilbert transform and explain the properties of Hilbert transform.   6

   c. An AM transmitter has antenna current of 2 A with modulation index of 60%. What will be the total antenna current if one more identical antenna is connected in parallel with the previous one, keeping the transmitter output same? Find the new modulation index.   8

2. a. Explain with block diagram the coherent detection of conventional AM waves. Explain frequency error and phase error in this method.   10

   b. An audio frequency signal $5sin2\pi(1000)$ is used to amplitude modulate a carrier of $100sin2\pi(10^6)t$. Assume modulation index as 0.4.
   Find; (i) side-band frequencies
   (ii) Amplitude of each side band
   (iii) B.W. required.   6

   c. Describe the working of envelope detector.   4

UNIT – II

3. a. Derive an output equation for ring modulator for sinusoidal modulating wave.   6

   b. Explain the operation of coherent detection of DSB-SC modulating wave.   6

   c. Obtain time description of SSB-SC wave.   8

4. a. Explain with block diagrams, quadrature carrier multiplexing and demultiplexing system.   6

   b. Explain the generation of SSB-SC wave using phase discrimination method with the help of neat functional block diagram. Bring out the merits and demerits of this method.   10

   c. Give the comparison between SSB generation methods.   4

UNIT - III

5. a. What is meant by VSB? Explain how VSB signal can be obtained from a modulating signal m(t) using a carrier $A_c cos(2\pi f_c t)$ and later demodulated?   10

   b. The Equation for an Fm wave is given by $s(t)=10sin(5.7x10^8 t + 5\ sin\ 12\ x\ 10^3 t)$. Calculate carrier frequency, modulation index, frequency deviation and power dissipation in 100 Ω resistor   10

6. a. Write a short note on frequency deviation and modulation index. 7

   b. Determine the bandwidth of FM signal,if the maximum value of frequency deviation of is fixed at 75 kHz for commercial FM broadcasting by radio & modulation frequency is $\omega = 15$ kHz 5

   c. With necessary equations and block diagram, Explain the generation of narrow band FM 8

UNIT - IV

7. a. Show that WBFM wave have infinite BW. 10

   b. Explain how FM wave can be generated using indirect method. 10

8. a. Give the comparison between NBFM and WBFM. 4

   b. Explain the detection process of FM signals using balanced frequency discriminator with relevant diagrams. 6

   c. Explain with relevant mathematical Expressions the demodulation of a FM signal using PLL. 10

UNIT - V

9. a. Derive the relation between noise figure and Equivalent. 6

   b. Explain different types of noise which effect the communication system. 8

   c. Write a short note on white noise. 6

10 a. Derive the expression for r.m.s. noise voltage at the output of passive RC low pass filter. 10

   b. Define noise factor and noise figure. Derive an expression for overall equivalent noise temperature of the cascade connection of any number of noise for two port network. 10

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