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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 $5\sin 2\pi(1000)t$ is used to amplitude modulate a carrier of $100\sin 2\pi(10^6)t$. Assume modulation index as 0.4.
Find; (i) side-band frequencies 6
(ii) Amplitude of each side band
(iii) B.W. required.
- 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 $s(t)=10\sin(5.7 \times 10^8 t + 5 \sin 12 \times 10^3 t)$. 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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