Analog Communication (Uddhav Bhattarai) F.M.-100

Time- 3 hrs

1.

1. Explain in brief the different blocks of a typical communication system with neat diagram. List out the need of modulation. 8
2. What do you understand by complex envelope? Show how complex low pass signal represents the narrowband signal. 7

2.

a)In an AM signals contains 700W at its carrier frequency and 300 W in each of its sidebands.

i. Determine the percent of modulation of the AM signal.

ii. Find the allocation of power if the percent of modulation is changed to 80%. 3+4

b) Define Hilbert transform. List out its properties Determine the Hilbert transform of

x(t) = A sin (2πf0t + θ) 8

3.

a)Explain amplitude modulation with its time domain expression. What is the impact of carrier transmission in power and bandwidth requirement? 8

b)Explain the non linear method of generation of DSB-AM wave. 7

4.

a) Draw a block diagram of super heterodyne receiver & explain functions of each block. 8

b) If c(t) = 20 cos 50000 (t), m(t) = 20cos(50000t + 6 sin 1000t), describe

i) Modulation index

ii) Peak Frequency deviation

iii) Bandwidth of modulated signal

iv) Modulated signal power dissipated in 15Ω resistance 7

5.

a)An Armstrong FM modulator is required in order to transmit an audio signal of bandwidth 50 Hz to 15 KHz. The narrowband phase modulator used for this purpose utilized a crystal controlled oscillator to provide a carrier frequency MHz. The output of the narrowband phase modulator is multiplied by  by a multiplier and passed to a mixer with a local oscillator frequency = 10.925 MHz, and a frequency deviation ∆f =75 KHz, which is obtained by multiplying the mixer output frequency with using another multiplier. Find and . Assume that NBFM produces deviation of 25 Hz for the lowest baseband signal. 8

b)“PLL can be used as an FM demodulator”. Justify it with necessary derivation 7

6.

a) What is broadcasting? What are its types? Explain each of them briefly. 5

b) What is communication Satellite? Classify and explain. 5 c)How CCITT standard group, Super group and master group are formed using SSB-SC in telephone? 5

7.Write Short notes on (*Any Two*): 5\*2

* 1. Distortion less Transmission Line
  2. Multiple access techniques
  3. FM stereo mulltiplexing