POKHARA UNIVERSITY

Level: Bachelor | Semester – Spring | Year : 2010
Programme: BE | Full Marks: 100
Course: Analog Communication | Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Name the three sub-systems involved in the block diagram of a communication system. 5

   b) State and explain the channel capacity theorem. Calculate the maximum data rate that could be send over a telephone line whose S/N ratio is 20dB and passes over the frequency range from 300-3400 Hz. 5

   c) If $m(t)=A_m\cos(2\pi f_m t)$. Find its Hilbert transform. 5

2. a) Define pre-envelope, complex envelope and natural envelope of a bandpass signal. 3

   b) Explain the operation of ring modulator for the generation of DSB-SC signal. 7

   c) Calculate the percentage of power saved when the carrier and one of the sidebands are suppressed in an AM wave modulated to a depth of 50% and 100%. 5

3. a) Derive the power relationship between the total sideband power and the total power in the AM wave. Assume $m(t) = A_m\cos(2\pi f_m t)$ and $c(t)= A_c\cos(2\pi f_c t)$ for you calculations. 8

   b) Briefly discuss the filter method for generation of SSB signal. Compare DSB-SC and SSB-SC with respect to transmission power, transmission bandwidth and receiver complexity. 7

4. a) Explain how envelope detector works along with necessary 4

conditions for charging and discharging time constants.

b) What is the reason behind using the SSB-SC modulated wave in telephony? 3

c) A single tone FM is represented by the voltage equation as: 8

$V(t) = 12 \cos (6\times10^{8}t + 5\sin 1250t)$

Determine the carrier frequency, modulating frequency, modulation index, maximum deviation. What power will this FM wave dissipate in 10Ω resistor?

5. a) What is a wideband FM (WBFM) wave? Derive its frequency domain expression. Also, show that there exist an infinite number of the side frequencies in its spectrum. 10

b) Explain the working principle of the FM stereo transmitter with the help of a neat diagram. 5

6. a) What are the types of modulation used in television broadcasting system? 8

b) Why the filters and oscillators are important in FDM system. 5

c) What are the three different modes of propagation of radio frequencies? 2

7. Write short notes on **any two:** 2×5

a) DTH companies in Nepal

b) Distortionless Transmission

c) Multiple access techniques