

CS/IT/EE - 405

B.E. IV Semester

Examination, June 2013

Analog and Digital Communication

Time : Three Hours

Maximum Marks : 70/100

Note: Attempt all questions.
All questions carry equal marks.

1. a) Determine the Fourier transform of dirac comb function.
- b) What is the concept of convolution? Derive an expression for convolutions of two functions $f_1(t)$ and $f_2(t)$

OR

- a) What is energy signal? State and prove the parseval's theorem for energy signals.
- b) Show that unit impulse response of an ideal low pass filter in non-causal.

OR

2. a) Explain the synchronous detection method of DSB-SC signals. Explain the effect of phase and frequency errors in synchronous detection?
- b) What is angle modulation? How the FM signal can be generated with PM signal? Discuss in detail.

OR

- a) A multiple -tone modulating signal $f(t)$, consisting of three frequency components, is given by

$$f(t) = E_1 \cos w_1 t + E_2 \cos w_2 t + E_3 \cos w_3 t$$
 Where $W_3 > W_2 > W_1$ and $E_1 > E_2 > E_3$
 This signal $f(t)$ modulates a carrier $e_c = E_c \cos w_c t$
 - i) Derive an expression for AM wave
 - ii) Draw a single-sided spectrum, and find the bandwidth of the AM wave.
- b) What do you mean by FM? Derive an expression for NBFM?

3. a) State and prove sampling theorem?
- b) Draw the schematic diagram of a Delta Modulation system and explain its working? What are the limitations and how are they overcome?

OR

- a) What is quantization error? How does it depend upon the step size? Suggest some methods to overcome the difficulties encountered when the modulating signal amplitude swing in large.
- b) In telephone channels, each band limited to 3.4KHz are to be time division multiplexed by using PCM. Calculate the bandwidth of the PCM system for the 128 quantization levels and an 8KHz sampling frequency.

4. a) With the help of block diagram, explain the generation and detection of DPSK signal. Also discuss why error rate in DPSK is greater than in PSK?

b) Explain the concept of QAM?

OR

- a) Draw the schematic diagram of QPSK generating system and explain its working?
- b) Explain the concept of M-ary FSK with the help of block diagram.

5. a) Apply Shannon-Fano coding procedure for $M=2$ and calculate the coding efficiency.

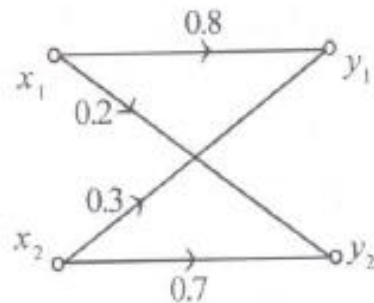
$$(\vec{x}) = [x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8]$$

$$(\vec{p}) = [1/4, 1/8, 1/16, 1/16, 1/16, 1/4, 1/16, 1/8]$$

- b) What do you mean by line encoding. Explain Manchester, RZ, and NRZ coding with suitable example?

OR

- a) Find the channel capacity of the channel shown in the figure.



Given $P(x_1) = 0.6$ and $P(x_2) = 0.4$.

- b) What is entropy? Show that the entropy is maximum when all the messages are equiprobable.