Roll No. .....

CS/EE/IT/BM–405(N)

B. E. (Fourth Semester) EXAMINATION, Dec., 2010

(New Scheme)

(Common for CS, EE, IT & BM Engg. Branch)

ANALOG AND DIGITAL COMMUNICATION

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any *five* questions select *one* question from each Unit. All questions carry equal marks.

Unit – I

1. (a) Calculate the Fourier transform of a given function along with spectrum analysis : 10

$$f(t) = u(t)$$

where $u(t)$ is a unit step function.

(b) Show that a Normalized Gaussian Pulse is its own Fourier transform. 10

Or

2. (a) Evaluate the Fourier transform of a trapezoidal function shown in fig. 1. 10

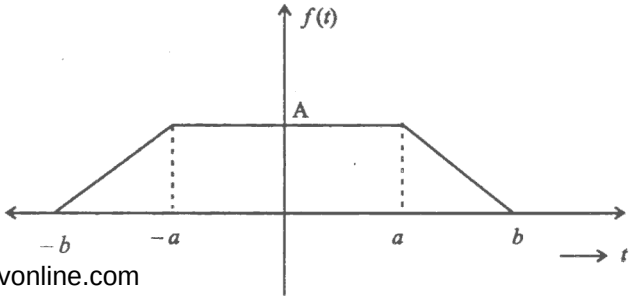

Fig. 1

(b) Define convolution. State and prove time convolution theorem in Fourier transform. 10

Unit – II

3. (a) With the help of a circuit diagram, explain the working of Balance modulator for DSB-SC generation. 10

(b) A modulating signal $5 \cos (25 \times 10^3 2\pi t)$, angle modulates a carrier $A_c \cos \omega_c t$: 10

(i) Find the modulation index and bandwidth for FM and PM systems.

(ii) Determine the change in the bandwidth and modulation index for both FM and PM if f_m is reduced to 7 kHz.

Assume $k_p = k_f = 15$ kHz/volt.

Or

4. (a) Derive the expression for FM and NBFM along with phasor diagram. 10

(b) Write a short note on VSB transmission with advantages of VSB transmission. 10

Unit – III

5. (a) A continuous time signal is given below : 10

$$f(t) = 8 \cos 200\pi t$$

then calculate :

(i) Minimum sampling rate.

(ii) If sampling rate frequency $f_s = 400$ Hz,. what is the discrete-time signal $X[n]$ obtain after sampling.

(b) Explain the block diagram of PCM system. Differentiate between DM and PCM. 10

Or

6. (a) Explain the advantages and disadvantages of Delta Modulation. How can we overcome these errors ? 10

(b) Calculate the transmission bandwidth in Pulse Amplitude Modulation (PAM) i. e., (BW $>>$ f_m). 10

Unit – IV

7. (a) Write a short note on OFFSET QPSK. 10

(b) A band pass transmission scheme uses PSK signaling scheme with :

$S_2(t) = A \cos \omega_c t,\ 0 \le t \le t_b,\ \omega_c = 10\pi/T_b$

$S_1(t) = -A \cos \omega_c t,\ 0 \le t \le T_b,\ T_b = 0{\cdot}2$ m sec.

The carrier amplitude at the receiver i/p is 1 m volt and the PSD of the additive white Gaussian noise at the input is 10^{-11} Watt/Hz. Assume that an ideal correlation receiver is used. Calculate the average bit error rate of the receiver. 10

Or

8. (a) Explain about MSK. Differentiate between QPSK and MSK. 10

(b) Explain BFSK on the basis of the following points : 10

(i) Generation of BFSK signal

(ii) Bandwidth of BFSK signal

(iii) Geometrical representation of orthogonal BFSK

Unit – V

9. (a) For the Binary Symmetric channel shown in fig. calculate the channel capacity. 10

(i) P = 0·9 and

(ii) P = 0·6

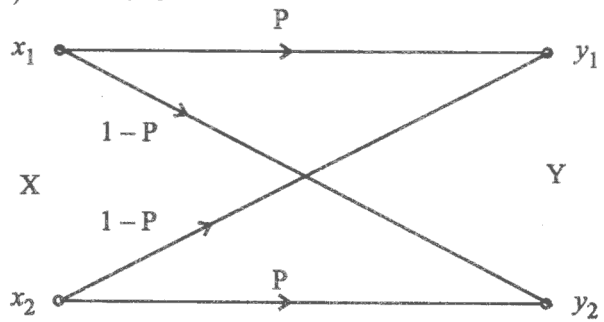

Fig. 2

(b) Apply the Shannon-Fanno code procedure for the following message : 10

[X] = X_1 X_2 X_3 X_4 X_5 X_6 X_7]

[P] = [0·4 0·2 0·12 0·08 0·08 0·08 0·04]

Take M = 2. Calculate the efficiency of message.

Or

10. (a) Define the following terms : 10

(i) Entropy

(ii). Rate of information

(iii) Channel capacity

(b) What do you mean by Line Encoding ? Explain the following codes : 10

(i) NRZ coding

(ii) Manchester coding