(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2118 Roll No. ☐☐☐☐☐☐☐☐☐

B.Tech.

(SEM. V) ODD SEMESTER THEORY
EXAMINATION 2013-14
PRINCIPLES OF COMMUNICATIONS

Time : 3 Hours   *Total Marks : 100*

Note :–Attempt **all** the questions. Each question carries equal marks.

1. Attempt any **four** parts of the following :   **(5×4=20)**

    (a) What is Modulation ? Why modulation is needed ?

    (b) Derive the relation between the output power of an AM transmitter and the depth of modulation.

    (c) Prove that the balanced modulator produces an output consisting of sidebands only, with the carrier removed.

    (d) Draw the block diagram of phase cancellation SSB generation and explain how the carrier and the unwanted sideband are suppressed.

    (e) When a broadcast AM transmitter is 50 percent modulated, its antenna current is 12 A. What will be the current when the modulation depth is increased to 0.9 ?

    (f) What is VSB modulation ? What is the application of VSB modulation ?

2. Attempt any **four** parts of the following : (5×4=20)

   (a) Derive the expression for the instantaneous value of an FM voltage and define the modulation index.

   (b) Draw the block diagram of balance frequency discriminator and explain it for demodulation of FM signal.

   (c) Illustrate the principle of Armstrong system of generating FM and PM signal.

   (d) With the help of suitable diagram explain the working of stereophonic broadcasting transmitter receiver.

   (e) What do you understand by instantaneous frequency, frequency deviation and bandwidth of FM wave ? A carrier wave of frequency 100 MHz is frequency modulated by a sinusoidal wave of amplitude 20 V and frequency 100 kHz. The frequency sensitivity of the modulator is 25 kHz per volt. Determine approximate band-width of FM Signal.

   (f) Draw the circuit diagram of a Foster-Seeley discrimination. Explain its principle of operation with the help of relevant phasor diagrams.

3. Attempt any **two** parts of the following : (10×2=20)

   (a) What is Quantization ? How can you minimize the quantization error ? How quantizing and coding is done ? Explain with suitable waveform.

   (b) Explain the Modulation and Demodulation of pulse width modulation system using suitable waveform. Also discuss how is the Pulse Position Modulation (PPM) generated through PWM (Pulse Width Modulation).

(c) (i) For the given binary sequence 1011001011 construct unipolar NRZ, unipolar RZ, bipolar NRZ, bipolar RZ, Alternate Mark Inversion (AMI) and Manchester format.

(ii) What is Companding ? What is the advantage of Companding ?

4. Attempt any **two** parts of the following : (10×2=20)

(a) What is the advantage of Differential Pulse Code Modulation over Pulse Code Modulation ? What is the limitation of Delta Modulation ?

(b) Discuss the classification, working advantages and one application of each type of Vocoders.

(c) What is Noise ? What are various forms and sources of noise ? Discuss the importance of S/N ratio in a radio-receiver.

5. Attempt any **two** parts of the following : (10×2=20)

(a) Analyze Noises present in Amplitude Modulation System and derive its signal to Noise Ratio. Find out the figure of merit in DSB-SC System.

(b) What is pre-emphasis and de-emphasis and how SNR improves by using pre-emphasis and de-emphasis ? Find out the figure of merit in SSB-SC System.

(c) What is Digital Phase Locked Loop ? Explain the working of an Ex-OR gate based digital phase comparator.