EEC502

(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 2012-13

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 baseband and passband signals ? Why is modulation of signal required for transmission over the channel ?

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

    (c) Explain the working principle of phase shift method generation of single sideband (AM) with the help of suitable diagram.

    (d) Calculate the percentage power saving when the carrier and one of the sideband are suppressed in an AM wave modulated to a depth of (i) 100% (ii) 75%.

    (e) The antenna current of an AM transmitter is 8 amp when only the carrier is sent, but it increase to 8.93 A when the carrier is modulated by a single sine wave.

Find the percentage of modulation. Determine the antenna current when the percentage of modulation changes to 0.8.

(f) What is the advantage of Quadrature Amplitude Modulator ? Explain with the help of suitable block diagram.

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

(a) Draw the circuit diagram of a Reactance Modulator and explain its principle of operation. Derive an expression for the equivalent capacitance in terms of the g_m of the device and the circuit component.

(b) What are the advantages of frequency modulation ? The carrier frequency of an FM broadcast transmitter is 100 MHz and maximum frequency deviation is 75 kHz. If the highest audio frequency modulating the carrier is 15 kHz, what is the approximate bandwidth of the signal ?

(c) Draw the block diagram of the indirect method of generation of frequency modulation system and explain the functions of each block.

(d) In an FM system when the audio frequency is 500 Hz and the AF voltage is 2.4 V, the deviation is 4.8 kHz. If the AF voltage is now increased to 7.2 V, what is the new deviation ? If the AF voltage is raised to 10 V, while the AF is dropped to 200 Hz, what is the deviation ? Find the modulation index in each case.

(e) Explain the working of a balanced frequency discriminator with the help of circuit diagram.

(f) Why is pre-emphasis and de-emphasis used in the frequency modulation ? Draw pre-emphasis and de-emphasis networks and characteristics.

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

(a) What do you understand by PCM (Pulse Code Modulation) ? How quantizing and coding is done ? Explain with suitable waveform.

(b) For the given binary sequence 011010110 construct unipolar NRZ, unipolar RZ, bipolar NRZ, bipolar RZ, Alternate Mark Inversion (AMI) and Manchester format.

(c) Using suitable circuit diagram, show how is the PPM (Pulse Position Modulation) is generated through PWM (Pulse Width Modulation).

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

(a) What is Differential Pulse Code Modulation ? Explain the working of Differential Pulse Code Modulation.

(b) What is delta modulation ? Discuss the errors in Delta Modulation. How they are overcome in adaptive Delta Modulation ?

(c) Discuss the multiplexing of PCM system. Describe T1 digital system in detail.

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

(a) What do you mean by figure of merit ? Derive an expression of figure of merit for a DSB-SC system.

EEC502/DLT-44161   3   *[Turn Over*

(b) What is frequency division multiplexing ? Explain the working operation of frequency division multiplexing with the help of block diagram.

(c) What is the advantage of Digital Phase Locked Loop ? Explain the working of a D-flip-flop based digital phase frequency detector.