53 (IE 603) CMEN

2019

COMMUNICATION ENGINEERING

Paper : IE 603

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer ***any five*** *questions.*

1. *(a)* Define the following terms : 3

   (i) Baseband Signal

   (ii) Carrier Signal

   (iii) Noise Signal.

   (b) Explain the block diagram of Wireless Communication System. 4

Contd.

(c) Differentiate between Guided propagation and Unguided propagation. 3

(d) What is Modulation ? What is the need for modulation ? 1+3=4

(e) Explain the need of Fourier transform with a suitable example in Communication System. 6

2. (a) If ω_c is carrier frequency, then show that in spectrum of AM wave baseband signal shifted in the positive and negative direction by factor ω_c. 7

(b) The total power content of an AM signal is 1000 *W*. Determine the power being transmitted at the carrier frequency and at each of the sidebands when the per cent modulation is 100%. 3

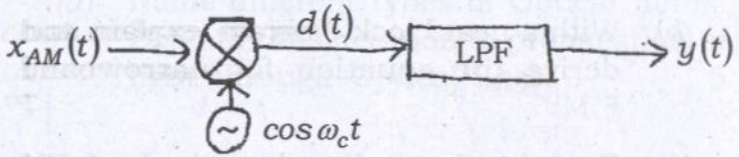
(c) Find out the efficiency of an AM wave if depth of modulation is 1. Write the power contents present in AM wave. 3

(d) Explain with a circuit diagram, the working of Square law diode modulation. Deduce an expression for its output. 7

3. (a) What is DSB-SC signal ? With a waveform show the phase reversal of DSB-SC at zero crossing. 2+2=4

(b) Explain Ring modulator to generate DSB-SC signal. 6

(c) Show that a synchronous demodulator shown in figure can demodulate an AM signal $x_{AM}(t) = [A + m(t)]\cos\omega_c t$ regardless of the value *A*. 3



(d) Explain how, diode can extract the envelope of an AM wave. 7

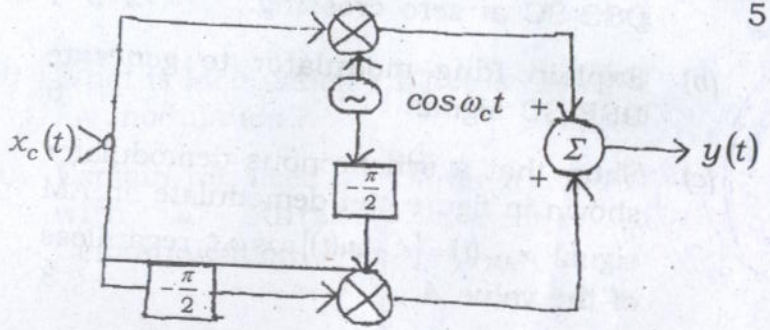
4. (a) Write the differences between low-level and high-level AM transmitters. 2

(b) What are the advantages of an R.F. amplifier ? 3

(c) What is Tuned Radio Frequency Receiver ? Give its drawbacks. 1+3=4

(d) With the help of a neat block diagram, explain superheterodyne receiver. Discuss its characteristics. 8+3=11

5. *(a)* Show that the system shown below can be used to demodulate an SSB signal. 5



(b) With a neat block diagram, explain and derive the equation for narrowband F.M. 7

(c) Explain the indirect method of FM generation. 5

(d) A carrier is frequency modulated (FM) by a sinusoidal modulating signal $x(t)$ of frequency 2 *kHz*, it results in a frequency deviation Δf of 5 *kHz*. Find the bandwidth occupied by the FM waveform. The amplitude of the modulating sinusoid is increased by a factor 3 and its frequency lowered by 1 *kHz*. Find the new bandwidth. 3

6. *(a)* What is Quantizer? Differentiate between Uniform and Non-uniform Quantizer. 4

(b) Derive the expression for signal to Quantization noise ratio (in *dB*) for Linear Quantization. 8

(c) Draw the following data formats for the bit stream 1100110— 3

(i) Unipolar RZ

(ii) AMI

(iii) Manchester.

(d) Name different types of Optical fibres. Explain the operation of propagation of light through Optical fibre. 5

7. Write short notes on : ***(any four)*** 4×5=20

(i) DFM

(ii) Delta Modulation

(iii) Satellite Systems

(iv) Balanced Modulator

(v) Phase Shift Method for SSB

(vi) PLL FM Demodulator.