Total number of printed pages–4

53 (IE 603) CMEN

2021

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)* With the help of example, explain Baseband Signal and Noise Signal. 3

   (b) Explain Communication System with the help of a neat block diagram. 5

   (c) Explain different propagation medium of communication systems. 6

   (d) Explain the need of Fourier transform with a suitable example in communication system. 6

Contd.

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) Prove that $I_T = I_c\sqrt{\left(1+m_a^2/2\right)}$. 3

(c) Explain collector modulation method to obtain AM wave. 8

(d) "Modulation has an important role with height of the antenna." Explain the statement. 2

3. *(a)* What is DSB-SC signal ? Explain Ring modulator to generate DSB-SC signal. 2+6=8

(b) Write the difference between DSB-SC and SSB-SC. With the help of a neat block diagram, explain phase-shift method for SSB-SC generation. 2+6=8

(c) In SSB-SC signal generation using phase discrimination method, the carrier phase shift network produces a phase shift which differs from $\pi/2$ by a small angle α. Obtain the output waveform. The modulating signal $x(t)$ may be considered to be a single tone sinusoidal signal $1{\cdot}0\cos\left(2\pi f_m t\right)$. 4

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

(b) With the help of a neat block diagram, explain Superheterodyne receiver. Also discuss its characteristics. 9+3=12

(c) What are the advantages of an RF amplifier ? 3

(d) The rejection of an image frequency signal by a single-tuned circuit is ———. *(Fill in the blank)* 1

5. *(a)* With a neat block diagram, explain and derive the equation for narrowband FM. 8

(b) Explain PLL FM demodulator. 6

(c) Explain the indirect method of FM generation. 6

6. *(a)* What is balanced slope detector in FM demodulation ? Also give its disadvantages. 5+2=7

(b) What is Quantizer ? 1

(c) Give differences between μ-law and *A*-law Compounding. 3

(d) Derive the expression for Signal to Quantization Noise Ratio (in dB) for Linear Quantization. 9

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

(i) Satellite Systems

(ii) FDM

(iii) VSB

(iv) Wideband FM

(v) Intersymbol Interference.