53 (IE 603) CMEN

2018

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 baseband signal, carrier signal, bandwidth and noise for a communication system. 4

   (b) With the help of a block diagram, explain the fundamental elements of a wireless communication system.

   4

   (c) Differentiate between twisted pair cable coaxial cable. 3

(d) Explain the need of Fourier transform with a suitable example in communication system. 7

(e) Give the limitation of baseband transmission. 1

(f) Uplink frequency band for satellite communication is _____ . 1

2. (a) What is Modulation ? Modulation helps reducing antenna height. Explain.

1+2=3

(b) 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

(c) Prove that $I_T = I_C = \sqrt{\left(1 + ma^2/2\right)}$.

3

(d) Explain collector modulation method to obtain AM wave. 7

3. (a) 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

(b) Explain balance modulator to generate DSB-SC signal. Also give mathematical analysis. 8

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

4

4. (a) Explain the following : 4+2=6

(i) Low level AM transmitters

(ii) Sensitivity of AM receiver.

(b) Explain the block diagram of superheterodyne receiver.

8

(c) Derive general expression for FM wave.

6

5. (a) A single tone FM is represented by the voltage equation as — 5

$$V(t) = 12\cos\left(6 \times 10^8 t + 5\sin 1250 t\right)$$

Determine :

(i) Carrier frequency

(ii) Modulating frequency

(iii) Maximum deviation

(iv) What power will this FM wave dissipate in 10Ω resistor ?

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

(c) Explain PLL FM demodulator. 6

(d) What is Carson's rule ? 2

6. (a) Differentiate between Uniform and Non-uniform Quantizer. 3

(b) Derive the expression for Signal to Quantization noise ration (in dB) for Linear Quantization. 7

(c)   Transmit a bit of sequence 10110101 and draw resulting waveform :

3

   (i)   Bipolar RZ

   (ii)   AMI

   (iii)   Manchester.

(d)   What is Satellite ? Name some applications of satellite.   3

(e)   Explain the operation of propagation of light through Optical fibre.   4

7.   Write short notes on : *(any four)*

5×4=20

   (i)   Envelope detector of AM wave

   (ii)   Ring Modulator

   (iii)   Delta Modulation

   (iv)   Crystal filter

   (v)   TV transmitter.

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