

Total number of printed pages-6

53 (IE 603) CMEN .

2017

**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 following with examples :

4×2=8

(i) Analog signal

(ii) Digital signal

(iii) Baseband Transmission

(iv) Modulation.

(b) Find the carrier power of signal

$A \cos \omega_c t$ .

2

Contd.

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

(d) A 400 watt carrier modulated to a depth of 75%. Find the total power in the amplitude modulated wave. Assume the modulating signal to be a sinusoidal one. 2

(e) Explain the technique used in low voltage level to obtain AM waves. 6

2. (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) What is SSB-SC signal? Explain phase-shift method to generate SSB-SC signal. 1+4=5

(d) 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  $\alpha$ . Obtain the output waveform. The modulating signal  $x(t)$  may be considered to be a single tone sinusoidal signal  $1.0 \cos(2\pi f_m t)$ .

5

3. (a) What is Tuned Radio Frequency Receiver? Explain. Give its drawbacks.

4+3=7

(b) With the help of a neat block diagram explain superheterodyne receiver. Also discuss its characteristics.

9+3=12

(c) The rejection of an image frequency signal by a single tuned circuit is

\_\_\_\_\_ .  
1

4. (a) What is angle modulation? Give different types of angle modulation.

1+2=3

(b) Give general expression for FM wave.

5



- (c) What is the modulation index of an FM signal having a carrier swing of  $100\text{kHz}$  when the modulating signal has a frequency of  $8\text{kHz}$ ? 2
- (d) Define wideband FM. Express the equation of wideband FM. 8
- (e) What is Carson's Rule? 2
5. (a) Define following : 2+2=4
- (i) PCM
- (ii) Quantizer.
- (b) Differentiate between Midtread and Midrise quantization. 4
- (c) Show that signal to noise power ratio of quantizer increases exponentially with increasing bits per sample. 4
- (d) A Television signal having a bandwidth of  $4.2\text{MHz}$  is transmitted using binary PCM system. Given that the number of quantization levels is 512. Determine code word length and transmission bandwidth. 4

(e) What is the importance of companding? Explain different types of compressor characteristics.

1+3=4

6. (a) Draw the following data formats for the bit stream 1100110 : 4

(i) Unipolar R<sub>z</sub>

(ii) Polar R<sub>z</sub>

(iii) AMI

(iv) Manchester.

(b) Explain laws of Kepler that govern the motion of a planet and other heavenly bodies. 5

(c) Explain block diagram of basic satellite transponder. 5

(d) Explain scanning principles of TV systems. 6

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

5×4=20

(i) Intersymbol Interference

(ii) VSB

(iii) FDM

(iv) Optical fiber

(v) Crystal lattice filter.