2025

ELECTRONICS — HONOURS

Paper : CC-13

(Communication Electronics)

Full Marks : 50

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer ***question no.* 1** and ***any four*** questions from the rest.

1. Answer ***any ten*** questions : 1×10

(a) What is the channel bandwidth of TV transmission in India?

(i) 10 MHz (ii) 9 MHz

(iii) 7 MHz (iv) 5 MHz.

(b) The amplitude of the carrier component of a FM wave is dependent on _____.

(i) the modulation index (ii) modulating signal frequency

(iii) carrier frequency (iv) maximum frequency deviation.

(c) A carrier of 100 W is modulated to the depth of 50%. The total transmitted power is

(i) 112.5 W (ii) 125 W

(iii) 150 W (iv) 175 W.

(d) In case of an AM, the carrier amplitude is 12V and the modulating signal amplitude is 8V. The modulation percentage is

(i) 33% (ii) 55%

(iii) 62% (iv) 67%.

(e) Sparking of pulse is an example of

(i) Thermal agitation noise (ii) Shot noise

(iii) Man-made noise (iv) White noise.

(f) If f_c be the carrier frequency and f_m be the frequency of the information signal, then for a DSB signal, frequency of the lower sideband (LSB) is

(i) $-f_c - f_m$ (ii) $f_c - f_m$

(iii) $f_c + f_m$ (iv) $-f_c + f_m$

(g) Minimum vertical antenna length required to send a signal of wavelength λ is

(i) $\lambda/2$ (ii) $\lambda/4$

(iii) 2λ (iv) 4λ.

(h) SINAD is generally used in the specification of

(i) AM receiver (ii) FM receiver

(iii) AM transmitter (iv) FM Transmitter.

(i) Which of the following scheme is also known as on-off keying?

(i) ASK (ii) FSK

(iii) BPSK (iv) QPSK.

(j) A PPM waveform can be derived from a

(i) PAM wave (ii) PCM wave

(iii) PWM wave (iv) PSK wave.

(k) The Bit rate and Baud rate are related by

(i) Bit rate = Baud rate / the number of bits per baud

(ii) Bit rate = Baud rate × the number of bits per baud

(iii) Baud rate = Bit rate × the number of bits per baud

(iv) Bit rate = Baud rate.

(l) PAM signals can be demodulated by using a

(i) Low Pass Filter (LPF) (ii) Schmitt trigger followed by a LPF

(iii) Differentiator followed by a LPF (iv) Clipper followed by a LPF.

2. (a) What is an electronic communication system? Draw its block diagram and explain the importance of transmitter, receiver and channel in an electronic commuication system.

(b) What is sampling theorem and aliasing error? (1+2+1+1+1)+(2+2)

3. (a) Define Modulation Index for amplitude modulation.

(b) An AM voltage is represented by, $V = 5\,[1 + 0.6 \cos (6280\, t)] \cos (2\pi \times 10^4\, t)$ volts, where t is in seconds. Calculate the (i) Carrier frequency (ii) Modulating signal frequency (iii) Depth of modulaion and (iv) Peak modulating Amplitude.

(c) Explain the operation of Envelop AM detector with a neat diagram. 2+(1+1+1+1)+4

4. (a) Compare FM and PM waves.

(b) Write short note on vestigial sideband signal.

(c) Consider an angle modulated signal,

$x_c(t) = 10 \cos [(10^8)\, \pi t + 5 \sin 2\pi (10^3)\, t]$. Find the maximum phase deviation and the maximum frequency deviation. 2+4+(2+2)

5. (a) What is noise? What are meant by internal noise and external noise?

(b) Define thermal noise and noise figure.

(c) Show that the noise voltage (thermal noise) of the series combination of resistors is equivalent to the vector sum of the voltages produced by the individual resistor. (1+2)+(2+2)+3

6. (a) Explain the basic principle of pulse width modulation.

(b) Illustrate pulse code modulation for any arbitrary analog waveform, when there are eight quantization levels and sixteen quantization levels. Comment on the differences. 3+(3+3+1)

7. (a) What is quantization error and quantization noise?

(b) Expain Frequency Division Multiplexing (FDM) Method. (3+3)+4

8. (a) What is Pulse code modulation?

(b) What are the advantages and disadvantages of BPSK signal? Draw the waveform of BPSK signal.

(c) Draw the waveforms of ASK and QPSK signal having a baseband signal– 01010011.

2+(2+2)+(2+2)
