2021

ELECTRONICS — GENERAL

Paper : GE/CC-3

(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, taking ***two*** from each ***Unit***.

1. Answer ***any ten*** questions from the following : 1×10

Indicate the correct alternative(s) [More than one option may be correct] :

(a) In an AM system, the amplifier following the modulated stage can be a
   (i) Linear amplifiers (ii) Harmonic Generators
   (iii) Class C power amplifiers (iv) Class B untuned amplifiers.

(b) If a signal band limited to fm is sampled at a rate less than 2fm, the constructed signal will be
   (i) Distortionless
   (ii) Small in amplitude
   (iii) Having higher frequencies suppressed
   (iv) Distorted.

(c) In phase modulation, the frequency deviation is
   (i) independent of modulating signal frequency
   (ii) inversely proportional to the modulating signal frequency
   (iii) directly proportional to the modulating signal frequency
   (iv) inversely proportional to the square root of the modulating frequency.

(d) Which of the following is useful in comparing the noise performance of receivers?
   (i) Input noise voltage (ii) Equivalent noise resistance
   (iii) Noise figure (iv) All of these.

(e) FM and PM are
   (i) Nonlinear analog modulation technique
   (ii) Linear analog modulation technique
   (iii) Digital modulation technique
   (iv) Angle modulation technique.

(f) Envelope detection technique is used in

(i) Amplitude modulation (ii) Phase modulation

(iii) Pulse amplitude modulation (iv) Pulse code modulation.

(g) Aliasing error occurs if

(i) samples are taken above Nyquist rate

(ii) samples are taken equal to Nyquist rate

(iii) samples are taken below Nyquist rate

(iv) None of the above.

(h) Which of the following are the examples of wireless network?

(i) Satellite network (ii) GSM and CDMA

(iii) GPRS (iv) All of the above.

(i) Which of the following statements are correct?

I. BPSK use alternative sine wave to encode the bits

II. The expression of modulating signal for BPSK is

$s(t) = A\cos(\omega_c t + \phi(t))$

$\phi(t) = 0^\circ$ if $Sm(t) = -5V$

$\phi(t) = 180^\circ$ if $Sm(t) = +5V$

where ω_c is the carrier frequency

(i) I is true but II is false (ii) both I and II are true

(iii) II is true but I is false (iv) both I and II are false.

(j) What are the schemes used for time division multiplexing (TDM)?

(i) Synchronous TDM and statistical TDM

(ii) Digital TDM and Analog TDM

(iii) Cycle stealing mode TDM

(iv) All of the above.

(k) Frii's equation gives a relation between

(i) received power to transmitted power of antenna

(ii) receiver antenna gains to transmitter antenna gains

(iii) receiver antenna SNR to transmitter antenna SNR

(iv) None of the above.

(l) Vestigial side band amplitude modulation (AM) technique is also a

(i) Single side band AM technique (ii) Double side band supressed carrier AM technique

(iii) SSBSC AM technique (iv) Asymmetric side band AM technique.

Unit – I

2. (a) What is amplitude modulation? Express modulation index in terms of maximum and minimum voltage of modulated signal.

(b) Derive the relation of O/P power of an AM transmitter and depth of modulation. (2+4)+4

3. (a) What do you mean by base band signal, carrier signal and noise signal?

(b) What is signal to noise ratio (SNR)?

(c) How noise figure can be calculated with the help of SNR? (2+2+2)+2+2

4. (a) Write down the expression for an FM signal with sinusoidal modulation, carefully defining each symbol used.

(b) Describe the principle of operation of slope detector circuit.

(c) Write down the advantages and disadvantages of AM and FM systems. 3+4+3

5. (a) Write down sampling theorem.

(b) Explain the working principle of pulse amplitude modulation.

(c) Write down a relative comparison among PAM, PWM and PPM. 2+5+3

Unit – II

6. (a) Briefly explain pulse code modulation (PCM).

(b) What is quantization error in PCM?

(c) With the help of a block diagram explain the working principle of frequency shift keying method in digital modulation. What are the various advantages of FSK over ASK? 2+3+(1+2+2)

7. (a) What are the problems of a wireless network? What will be the approach to overcome the problems?

(b) Explain the concept of GSM with suitable diagram.

(c) What are bit rate and baud rate? (2+2)+4+2

8. (a) What is the need for Satellite Communication?

(b) Give definitions of the following :

(i) Path Loss

(ii) Ground Station

(iii) Uplink

(iv) Downlink. 2+(2×4)
