2020

ELECTRONICS — GENERAL

Paper : GE/CC-3

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) The radio spectrum is the part of the electromagnetic spectrum with frequencies from

(i) 30 Hz to 300 GHz (ii) 30 Hz to 300 MHz

(iii) 30 KHz to 300 GHz (iv) None of these.

(b) Baseband signals are those

(i) without modulation (ii) with amplitude modulation

(iii) with frequency modulation (iv) with phase modulation.

(c) In amplitude modulation, the amplitude of the carrier of frequency f_c is A_c and the modulating wave is $e_m = E_m \cos f_m t$. Then the change in amplitude of the carrier is

(i) directly proportional to E_m (ii) directly proportional to e_m

(iii) inversely proportional to e_m (iv) inversely proportional to E_m.

(d) For frequency modulation f_d is the frequency deviation and f_m is the modulating frequency. The modulation index is given by

(i) f_d / f_m (ii) f_m / f_d

(iii) $f_m f_m$ (iv) $f_d - f_m$.

(e) The frequency of a modulating signal is f_m. The bandwidth required

(i) for A.M. is $2f_m$ (ii) for A.M. is f_m

(iii) for F.M. is greater than that of A.M. (iv) for F.M. is less than that of A.M.

(f) In a satellite communication the up-link frequency is f_u and the down-link frequency is f_d.

(i) $f_u = f_d$ (ii) $f_u - f_d = 2$ GHz

(iii) $f_d - f_u = 2$ GHz (iv) $f_u - f_d = 2$ MHz.

(g) Which of the following is true?
  (i) Internal noise obeys certain physical laws
  (ii) External noise obeys certain physical laws
  (iii) Shot noise is an external noise
  (iv) No noise is produced in a capacitor.

(h) Quantization error occurs in
  (i) TDM (ii) FDM
  (iii) PCM (iv) None of these.

(i) Data transmission rate is measured by
  (i) Bit rate (ii) Signalling rate
  (iii) Baud rate (iv) None of these.

(j) Voice and data
  (i) can be transmitted simultaneously in both GSM and CDMA
  (ii) can be transmitted simultaneously in GSM but not in CDMA
  (iii) can be transmitted simultaneously in CDMA but not in GSM
  (iv) cannot be transmitted simultaneously in GSM or CDMA.

(k) IMEI number has generally
  (i) 10 digits (ii) 11 digits
  (iii) 15 digits (iv) 20 digits.

(l) The process of converting the analog sample into discrete form is called
  (i) Modulation (ii) Multiplexing
  (iii) Quantization (iv) Sampling.

Unit - I

2. (a) What is frequency modulation? Obtain the expression for the frequency modulated wave. What is meant by frequency deviation?

(b) A 25 MHz carrier wave is modulated by a 400 Hz sinusoidal signal. The carrier voltage is 4 V and the frequency deviation is 10 kHz. Write the equations for this modulated wave for frequency modulation and phase modulation. (2+3+2)+3

3. (a) Give the block diagram of an AM receiver and state the function of each block.

(b) What is DSBSC? State its advantages. 5+(2+3)

4. (a) What is meant by noise in electronic communication? What is internal noise? Name two internal noise.

(b) What is noise figure?

(c) Briefly discuss the principle of a super heterodyne receiver. (2+2+1)+2+3

5. (a) What are meant by a communication channel and channel capacity?

(b) What is frequency division multiplexing? Give an example where it is used. Mention two advantages and two disadvantages of FDM. 3+(3+1+3)

Unit - II

6. (a) What is a communication satellite? Explain how many satellites are required for communication over the globe.

(b) Derive Friis transmission equation. What is path loss? (2+2)+(4+2)

7. (a) Give the block diagram of digital transmitter and state the function of the blocks.

(b) What is Shannon limit for Information capacity? (2+5)+3

8. (a) Briefly discuss the principle of cellular communication. Discuss what the shape of the cells for maximum coverage is.

(b) What is meant by handoff in cellular communication?

(c) What is data encryption? What is its need? (4+2)+2+(1+1)
