

2022

**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. Indicate the correct alternative(s) (more than one option may be correct) : 1×10
- (a) The modulation frequency is  $f_m$ . The modulation index for FM signal is proportional to
- |                           |                 |
|---------------------------|-----------------|
| (i) $f_m$                 | (ii) $f_m^{-1}$ |
| (iii) frequency deviation | (iv) $f_m^2$ .  |
- (b) In an AM the carrier amplitude is 12V and the modulating signal amplitude is 8V. Modulation percentage is
- |          |           |
|----------|-----------|
| (i) 33   | (ii) 50   |
| (iii) 67 | (iv) 150. |
- (c) Quantization is needed in case of
- |           |           |
|-----------|-----------|
| (i) PCM   | (ii) PAM  |
| (iii) PDM | (iv) ASK. |
- (d) The term channel is used to indicate
- (i) the amplitude range allocated to a given source.
  - (ii) the frequency range allocated to a given source.
  - (iii) the voltage-range allocated to a given source.
  - (iv) All of the above.
- (e) Vestigial side band modulation technique is a type of
- |                            |                           |
|----------------------------|---------------------------|
| (i) Phase modulation       | (ii) Frequency modulation |
| (iii) Amplitude modulation | (iv) Pulse modulation.    |
- (f) 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.

**Please Turn Over**

- (g) Which of the following statement(s) is/are correct?
- In frequency modulation the instantaneous carrier frequency is made to vary linearly with respect to the message signal.
  - Frequency and phase modulation are together known as angle modulation.
  - Frequency modulation has good and clear reception over noise than amplitude modulation.
  - All of the above.
- (h) In digital modulation the S/N ratio can be increased by
- increasing the number of bits per sample.
  - decreasing the number of bits per sample.
  - increasing the baud rate.
  - decreasing the baud rate.
- (i) A signal has no frequency components higher than  $W$  Hz. The sampling theorem states that, 'a signal can be exactly reproduced if it is sampled at the rate  $f_s$  which is
- greater than  $3W$
  - less than  $2W$
  - equal to  $2W$
  - greater than  $4W$ .
- (j) Among analog pulse modulation techniques which one gives best noise advantage?
- PAM
  - PWM
  - PPM
  - Both PWM and PPM.
- (k) To detect a pulse coded modulated signal we simply need a
- DAC network
  - ADC network
  - Band pass filter
  - Sharp cut-off filter.
- (l) Which of the following modulation technique is used in satellite communication?
- Pulse code modulation technique
  - Frequency shift keying method
  - BPSK method
  - Delta modulation technique.
2. (a) What is modulation?
- (b) Draw the frequency spectrum of a double side band AM signal and double side band suppressed carrier AM signal. Hence comment on these two frequency spectrums.
- (c) The antenna current of an AM transmitter is 8A when only the carrier is sent. But increases to 8.93 A when the carrier is modulated by a sinusoidal wave. Find the modulation index.
- $2+(1\frac{1}{2}+1\frac{1}{2}+2)+3$
3. (a) What is the physical significance of modulation index in tone amplitude modulation? What modification is needed if the carrier is modulated by several sine waves?
- (b) What is meant by balanced modulator?
- (c) Compare AM and FM system in terms of noise, efficiency and depth of modulation.  $(2+3)+2+3$

4. (a) What is the relation between FM and PM?  
(b) Explain the operation of a phase locked loop in detection of a FM signal.  
(c) Briefly explain the operation of a FM transmitter with a neat diagram. 3+3+4
5. (a) What do you mean by base band signal and carrier signal?  
(b) Define thermal noise, noise figure and equivalent noise temp.  
(c) What is white noise? (1+1)+(2+2+2)+2
6. (a) What is pulse amplitude modulation?  
(b) Draw the waveforms of double polarity PAM signal and single polarity PAM signal.  
(c) What are the advantages and disadvantages of PAM?  
(d) What are meant by TDM and FDM? 1+(1+1)+3+(2+2)
7. (a) What is data encoding?  
(b) What are the advantages and disadvantages of FSK?  
(c) What is the principle of BPSK?  
(d) Draw the waveform of a FSK signal. 2+3+3+2
8. (a) What is quantization error and quantization noise?  
(b) State the differences between uniform and nonuniform quantization. (3+3)+4
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