

3 (Sem-4) ELE M 2

2016

ELECTRONICS

( Major )

Paper : 4-2

( Communication System )

Full Marks : 60

Time : 3 hours

*The figures in the margin indicate full marks  
for the questions*

1. Choose and write the correct one :  $1 \times 7 = 7$

(a) A carrier signal is amplitude-modulated simultaneously by three message signals of frequency 2 kHz, 4 kHz and 6 kHz. The bandwidth of the AM signal is

(i) 4 kHz

(ii) 8 kHz

(iii) 12 kHz

(iv) None of the above

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( Turn Over )



- (b) Local oscillator frequency of AM radio receiver is
- (i) equal to sum of signal frequency and IF frequency
  - (ii) greater than sum of signal frequency and IF frequency
  - (iii) double times the IF frequency
  - (iv) None of the above
- (c) An ideal communication channel has 3 kHz bandwidth and Nyquist rate of 6000 bps. Signal to noise ratio of the channel is
- (i) 2 : 1
  - (ii) 4 : 1
  - (iii) 3 : 1
  - (iv) None of the above
- (d) Companding technique ensures that
- (i) signal is compressed at receiver and expanded at transmitter
  - (ii) signal is compressed at transmitter and expanded at receiver
  - (iii) signal is compressed at both transmitter and receiver
  - (iv) None of the above

- (e) Pulse width modulation technique has disadvantage of
- (i) causing power handling problem of transmitter at the maximum pulse width
  - (ii) failed communication process in the event of losing synchronization between transmitter and receiver
  - (iii) difficult demodulation process
  - (iv) None of the above
- (f) Quantization error is
- (i) caused by interference with external noise signals
  - (ii) completely deterministic in nature
  - (iii) random in nature
  - (iv) None of the above
- (g) FM radio signal provides better audio signal quality due to
- (i) smaller bandwidth of modulation
  - (ii) larger bandwidth of modulation
  - (iii) higher carrier frequency
  - (iv) None of the above



2. Answer any four of the following :  $2 \times 4 = 8$

(a) An FM signal is given by  
 $v(t) = 0.5 \sin(6 \times 10^8 t + 2 \sin 2000t)$ .

Determine frequencies of carrier and message signal.

(b) How can you determine thermal noise voltage due to several resistors connected in parallel?

(c) A radio transmitter broadcasts AM signal at 10 kW power level. How much of the transmitted power is the carrier power? Assume that modulation index is 60%.

(d) Mention the advantage and disadvantage of pulse-position modulation technique.

(e) Mention the advantage of SSB transmission.

(f) What do you mean by diagonal clipping in AM demodulation?

3. (a) Explain briefly about time-division multiplexing process of signal in communication systems. 5

(b) Explain briefly about generation and demodulation of PCM signal. 5

(c) State and prove Parseval's theorem. 5

Or

How will you determine power-spectral density and energy-spectral density of signals? 5

4. Answer any three of the following :  $10 \times 3 = 30$

(a) Discuss briefly about information theory of communication system.

(b) Describe the types of internal noise that hamper communication systems.

(c) Describe in detail about the functional blocks of a superheterodyne AM radio receiver.

(d) Derive the mathematical expression for AM signal and determine its Fourier transform.

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