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3 (Sem-3/CBCS) ELE HG/RC

2021

(Held in 2022)

**ELECTRONICS**

(Honours Generic/Regular)

Paper : ELE-HG/RC-3016

**(Communication System)**

Full Marks : 60

Time : Three hours

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

1. Answer the following questions :  $1 \times 7 = 7$ 
  - (a) What do you mean by signal-to-noise ratio?
  - (b) Draw the spectrum of an amplitude-modulated wave.
  - (c) What is Amplitude Shift Keying?

Contd.

- (d) Write down one advantage of frequency modulation over amplitude modulation.
- (e) What is the full form of IMEI?
- (f) What is handoff in a cellular communication?
- (g) What happens when modulation index is greater than 1?

2. Answer **any four** questions :  $2 \times 4 = 8$

- (a) List the types of noise in communication system.
- (b) Define sampling theorem.
- (c) What is vestigial-sideband modulation?
- (d) Explain the concept of frequency reuse in cellular communication.
- (e) List the key differences between 3G and 4G communication systems.
- (f) Why are carrier waves of higher frequency compared to modulating signal?

3. Answer **any three** of the following :  $5 \times 3 = 15$

- (a) Discuss in detail about the active and passive satellite systems.
- (b) Draw the block diagram of an electronic communication system. Discuss the function of each block in detail.
- (c) Derive an expression for frequency-modulated wave.
- (d) Write down the comparisons between analog and digital communication systems.
- (e) How can amplitude demodulation be done using diode detector? Explain with necessary diagram.

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

- (a) What is quantization? Discuss the process of quantization in detail. Derive the mathematical expression for quantization noise.

(b) Draw the simplified block diagram of frequency-division multiplexing. Explain its working. List the comparisons between TDM and FDM.

(c) Explain briefly about noise temperature, and noise figure. Derive an expression for noise figure in a communication system.

(d) A message signal  $m(t)$  is amplitude-modulated with a carrier signal  $c(t)$  given below :

$$m(t) = 15 \cos(2\pi \times 100t) \text{ and}$$

$$c(t) = 34 \cos(2\pi \times 10000000t)$$

Find the modulation index, the carrier power, total transmitted power and final expression of amplitude-modulated wave. Also, find the percentage change in modulation index, if the carrier amplitude is increased from 34 to 50 volt.

(e) Write short notes on : 5×2=10

(i) CDMA technology

(ii) PLL-based FM detector.