

3 (Sem-5) ELE M 3

2 0 1 6

ELECTRONICS

(Major)

Paper : 5.3

(Digital Communication)

Full Marks : 60

Time : 3 hours

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

1. Fill in the blanks : 1×5=5

- (a) A random process whose statistical characteristics do not change with time is classified as a _____ random process.
- (b) A process of reconstructing a continuous time signal $g(t)$ from its sample $i(t)$ is known as _____.
- (c) If the sample of message signal is used to vary the duration of individual pulse in the carrier, it is called _____ modulation.

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(Turn Over)

(2)

- (d) Delta modulation with PCM system requires a higher _____ rate.
- (e) Spread spectrum is a mean occupies excess bandwidth of a minimum _____ necessary to send the signal.

2. Answer the following in brief : $2 \times 5 = 10$

- (a) What is a random process? Distinguish a random variable from a random process.
- (b) What are different forms of pulse modulation?
- (c) To generate PCM signal, why is quantization necessary before an encoder?
- (d) Sketch the binary ASK waveform for the following bit sequence :
 $0\ 1\ 1\ 0\ 1\ 0\ 1\ 1$
- (e) What is the importance of pseudo-noise sequence in spread spectrum communication system?

(3)

3. Answer any *seven* from the following :

- (a) Draw the block diagram of a digital communication system. Give a comparison between different digital modulation schemes. $2+3=5$
- (b) Discuss the transmission of a random process through a linear time invariant filter. 5
- (c) What do you mean by correlation of a random variable? Distinguish between auto-correlation and cross-correlation between two random variables. $2+3=5$
- (d) Draw the block diagram of a TDM system and discuss its operation. How is synchronization done in TDM based system? $4+1=5$
- (e) How is delta-sigma modulation different from delta modulation? Draw the equivalent model of delta-sigma modulation system. $3+2=5$
- (f) What do you mean by sampling of analog signal? Discuss how an analog signal can be converted to digital signal using a PCM based system. $2+3=5$

(4)

- (g) Discuss the scheme of generation and detection of dual phase-shift keying scheme. 5
- (h) What are the advantages of QAM over other modulation system? Discuss the generation of QAM signal. 1+4=5
- (i) What is power spectral density? Discuss different properties of power spectral density. 2+3=5
- (j) What is minimum shift keying? Discuss the block diagram of coherent detection of binary FSK signal. 2+3=5
4. Write short notes on any *two* of the following : 5×2=10
- (a) Frequency-hopping spread spectrum
 - (b) CDMA-based wireless communication system
 - (c) GSM-based mobile communication system
