**F-985**

# M.Sc. Fourth Semester (Main/ATKT) Examination May-June : 2022

## Physics

Paper: Fourth (B)

## Electronics-II (Communication)

Time : 3 Hours | Maximum marks : 80

**Note: attempt all sections**

**Section – A**
**(objective /multiple-choice questions)**
**Each has one marks**

1. The crosstalk in a PAM-TDM signal can be reduced by ...

(a) Reducing the channel bandwidth BT (b) Increasing the channel bandwidth BT
(c) Reducing the time spacing between the adjacent pulses (d) both a & b

2. In pulse code modulation (PCM), the information is transmitted in the form of

(a) variation in the amplitude of pulses (b) variation in the width of pulses
(c) variation in the position of pulses (d) code words each of N bit length

3. In a PCM system, the number of quantization levels are 16 and the maximum signal frequency is 4 kHz, the bit transmission rate is

(a) 64 bps (b) 16 kbps (c) 32 kbps (d) 32 bps

4. PCM systems require regenerative repeaters over long distances. The correct sequence of the operations in which such a repeater performs is

(a) Timing, equalisation and decision-making (b) Equalization, timing and decision-making (c) Timing, theresholding and equalisation (d) Thresholding, timing and equalization

5. The non-uniform quantization leads to

(a) reduction in transmission bandwidth (b) increase in maximum SNR
(c) increase in SNR for low level signals (d) simplification of quantization process

6. The quantizer in the PCM transmitter is used for

(a) converting the analog signal into N bit digital word (b) converting the N bit parallel word into a serial output
(c) rounding off each sample value of its nearest standard value (d) all of these

7. For a DPSK scheme, the bit error probability is given by

(a) $\frac{1}{2}\text{erfc}\left(\sqrt{\frac{E_b}{2000}}\right)$ (b) $\frac{1}{2}\text{erfc}\left(\sqrt{\frac{E_b}{N_0}}\right)$ (c) $\frac{1}{2}\exp\left(\sqrt{\frac{-E_b}{2000}}\right)$ (d) $\frac{1}{2}\exp\left(\frac{-E_b}{N_0}\right)$

8. For coherent FSK system, the bit error probability is given by

(a) $\frac{1}{2}\text{erfc}\left(\sqrt{\frac{E_b}{2N_0}}\right)$ (b) $\frac{1}{2}\text{erfc}\left(\sqrt{\frac{E_b}{N_0}}\right)$ (c) $\frac{1}{2}\text{erfc}\left(\frac{\sqrt{E_b}}{4N_0}\right)$ (d) $\frac{1}{2}\text{erfc}\left(\sqrt{\frac{E_b}{2000}}\right)$

9. The bit rate of a digital communication system is 34 Mpbs. The modulation scheme is QPSK. The baud rate of the system is

(a) 68 Mpbs (b) 34 Mbps (c) 17 Mbps (d) 85 Mbps

10. What is the relation between number of quantization levels and the number of bits per word?

(a) $Q = 2N$ (b) $Q = N$ (c) . $Q = 2^N$ (d) . $Q = N^2$

11. For increasing the signal to quantization noise by 6 dB, we have to increase the number of bits per PCM word by

(a) 1 (b) 2 (c) 3 (d) 4

12. QPSK is a .....

(a) Two level modulation (b) Multilevel modulation (c) both a & b (d) None of them

13. For transmission of normal speech signal the PCM channel needs a bandwidth of

(a) 64 kHz (b) 8 kHz (c) 4 kHz (d) 2 kHz

14. Quantizing noise occurs in

(a) time-division multiplex (b) frequency-division multiplex
(c) pulse-code modulation (d) pulse-width modulation

15. One of the following systems is analog

(a) PCM (b) delta (c) differential PCM (d) PAM

16. In a DM system, the granular (idling) noise occurs when the modulating signal

(a) increase rapidly (b) remains constant (c) decreases rapidly (d) the nature of modulating signal has nothing to do with this noise

17. The signal to quantization noise ratio in a PCM system depends upon

1. sampling rate 2. number of quantization levels 3. message signal bandwidth

(a) 1, 2 and 3 (b) 2 and 3 only (c) 2 only (d) 3 only

18. Consider the following statements comparing DM and PCM systems, DM requires

1. a lower sampling rate 2. a higher sampling rate 3. a larger BW 4. simple hardware

Which of these statements are correct?

(a) 1, 2 and 4 (b) 1, 2 and 3 (c) 1, 3 and 4 (d) 2, 3 and 4

19. In a DM system, the granular noise occurs when the

(a) modulating signal increases rapidly (b) pulse rate decreases
(c) modulating signal remains constant (d) pulse amplitude increases

20. Which are the noise sources are:

(a) Natural sources (b) Man-made sources (c) Fundamental or internal sources (d) all of these

**Section – B**
**(Very short answer types question)**
**Each of two marks**

1. Define the sampling process.
2. Define a low pass signal.
3. why is PCM not used for radio broadcasting?
4. What is quantization?
5. Why should the sampling rate be greater than 2W?
6. What type of receiver is used for BFSK reception?
7. What do you mean by Pulse-Time Modulation ?
8. How many phases are transmitted in QPSK?

**Section – C**
**(Short answer type question)**
**Each of three marks**

1. Define PAM and explain its generation and detection.
2. What is a Baseband binary PAM system? Explain.
3. Write the power spectral density of BPSK.
4. State in brief the modulation techniques used for digital communication.
5. State and prove sampling theorem in time domain.
6. How is the 'information' transmitted in a PCM system?
7. Why is quantization necessary?
8. Explain Differential pulse code modulation.

**Section – D**
**(Long answer types questions)**
**Each of 5 marks**

1. Draw the signal space representation of QPSK and BPSK signals.
2. Draw the block diagram of QPSK system and explain its working
3. Compare PCM, DM, ADM & DPCM
4. Explain the quantization error and derive an expression for maximum signal to noise ratio in PCM system that uses Linear quantization