

**Scheme – I**  
**Sample Question Paper**

**Program Name** : Diploma in Electronics and Telecommunication Engineering  
**Program Code** : EJ/EN/ET/EX/EQ  
**Semester** : Fourth  
**Course Title** : Digital Communication Systems  
**Marks** : 70

22428

**Time: 3 Hrs.**

---

**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

**Q.1) Attempt any FIVE of the following:**

**10 Marks (5X2)**

- (a) State Shannon Hartley theorem.
- (b) State 4 advantages of digital communication.
- (c) State sampling theorem
- (d) List any 2 advantages of M-ary signaling over binary modulation.
- (e) State the need of multiplexing.
- (f) List different types of multiple access techniques.
- (g) State two advantages of spread spectrum modulation.

**Q.2) Attempt any THREE of the following:**

**12 Marks (3X4)**

- (a) Write the values of following parameters for coaxial cable and fibre optics cable
  - i. bit rate
  - ii. repeater distance
- (b) State the drawbacks of Delta modulation. List the methods to overcome the same
- (c) Explain quantization process with neat sketch.
- (d) Explain the generation of BFSK signal with the help of block diagram.

**Q.3) Attempt any THREE of the following.**

**12 Marks (3X4)**

- (a) Explain Checksum method of error detection with example.
- (b) Draw the block diagram of ADM transmitter and with the help of relevant waveform explain its working.
- (c) Draw the block diagram of FDMA system and explain its working.
- (d) Apply the concept of multiplexing to draw the schematic diagram for 4-channels with bursty traffic.

**Q.4) Attempt any THREE of the following.**

**12 Marks (3X4)**

- (a) Explain hamming code for one bit error detection with example for data 1101.
- (b) Explain with the help of block diagram, the working of a DPCM transmitter.
- (c) Draw the neat diagram of CCITT digital multiplexing hierarchy and explain in brief.
- (d) Explain with the help of block diagram, the working of a BPSK DSSS transmitter.
- (e) Encode binary sequence 11010100 using URZ, NRZ –L, AMI and Differential Manchester line coding techniques.

**Q.5) Attempt any TWO of the following.**

**12 Marks (2X6)**

- (a) The probabilities of five source messages are  $m_1=0.2$ ,  $m_2=0.3$ ,  $m_3=0.2$ ,  $m_4=0.15$ , and  $m_5=0.15$ .
  - i. Generate Huffman codes for the given source.
  - ii. Find the coding efficiency for Huffman coding.
- (b) Justify that in DPSK system, error always occurs in pairs with example?
- (c) Delta Modulation as the special case of Differential Pulse Code Modulation. Justify the given statement along with block diagram and waveforms of Delta Modulation.

**Q.6) Attempt any TWO of the following.**

**12 Marks (2X6)**

- a) Interpret the steps to convert digital signal into analog signal using QPSK modulation with suitable block diagram.
- b) Draw the neat block diagram of QAM system, explain its working.
- c) Draw the circuit diagram of a PN sequence generator for generating PN sequences of length 15. Assuming initial contents of the shift register, to be all ones, explain its working. Generate the output sequence.

**Scheme – I**  
**Sample Test Paper - I**

**Program Name** : Diploma in Electronics and Telecommunication Engineering  
**Program Code** : EJ/EN/ET/EX/EQ  
**Semester** : Fourth  
**Course Title** : Digital Communication Systems  
**Marks** : 20

**22428**

**Time: 1 Hour**

---

**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

**Q.1 Attempt any FOUR.**

**08 Marks (4X2)**

- a) State 4 advantages of digital communication.
- b) Define bit rate and baud rate. Write the relationship between them.
- c) Compare PCM and DM based on number of bits required to encode each sample, complexity.
- d) Write down the expression for the Shannon Hartley law and explain its implications.
- e) Draw the block diagram of digital communication system.

**Q.2 Attempt any THREE.**

**12 Marks (3X4)**

- (a) If a TV signal of 4.5MHZ bandwidth is transmitted using 8 bit binary PCM ,  
determine
  - a. The maximum signal to quantization noise ratio
  - b. The minimum bit rate
- (b) Draw the waveform for bit stream 1100010101 using
  - a. UPRZ
  - b. BPRZ
  - c. Manchester
  - d. AMI
- (c) With the help of block diagrams of the PCM transmitter, explain its working principle.
- (d) Explain with a example, CRC method of error detection.

**Scheme – I**  
**Sample Test Paper - II**

**Program Name** : Diploma in Electronics and Telecommunication Engineering  
**Program Code** : EJ/EN/ET/EX/EQ  
**Semester** : Fourth  
**Course Title** : Digital Communication Systems  
**Marks** : 20

**22428**

**Time: 1 Hour**

---

**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

**Q.1 Attempt any FOUR.**

**08 Marks (4X2)**

- (a) With the help of constellation diagram, compare QPSK and 8-QAM.
- (b) State any 2 advantages of M-ary signaling.
- (c) Compare TDMA and FDMA with respect to:
  - i. Definition
  - ii. Synchronization
  - iii. Bandwidth requirement
  - iv. Application
- (d) Compare DSSS and FHSS based on
  - i. Definition
  - ii. Security
  - iii. Near far problem
  - iv. Acquisition time
- (e) State the need of multiplexing.

**Q.2 Attempt any THREE.**

**12 Marks (3X4)**

- (a) Generate PN sequence using 4 D flip flop with initial state as 0001.
- (b) Select a suitable multiplexing technique for uniform traffic data and explain working with block diagram.
- (c) With the help of neat block diagram, explain the working principle of a QPSK transmitter.
- (d) Explain with the help of block diagram, the working of a BPSK DSSS transmitter.