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 m1=0.2, m2=0.3, m3=0.2, m4=0.15, and m5=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.
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 110010101 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 an example, CRC method of error detection.
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 DSSSS transmitter.