

22428

23124

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.
  - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

1. Attempt any FIVE of the following :

5 × 2 = 10

- (a) State sampling theorem.
- (b) Define the following terms :
  - (1) Codeword
  - (2) Hamming weight
- (c) State the types of distortions observed in DM system.
- (d) State any two advantages of digital communication system.
- (e) State any two advantages of CDMA.
- (f) State any two applications of spread spectrum modulation.
- (g) List any four advantages of TDMA over FDMA.



**2. Attempt any THREE of the following :****3 × 4 = 12**

- (a) Compare PCM & DPCM on the basis of following parameters :
- (1) No. of bits per sample
  - (2) Step size
  - (3) Distortions
  - (4) Feedback from o/p
- (b) State Hartley's law & Shannon Hartley's theorem.
- (c) Describe slope overload & granular noise in DM system.
- (d) Describe generation of BFSK signal with the help of block diagram.

**3. Attempt any THREE of the following :****3 × 4 = 12**

- (a) A sequence of independent symbols A, B, C & D with the probabilities 0.5, 0.25, 0.125 & 0.125 respectively is produced by source.

Determine :

- (1) The source Entropy
  - (2) Information rate if one symbol appears at the input of source encoder in 1 ms.
- (b) Draw the block diagram and waveform of DM transmitter.
- (c) Describe TDM technique with relevant diagram.
- (d) Compare TDMA & CDMA on basis of
- (1) Sharing of time & bandwidth
  - (2) Synchronisation
  - (3) Codeword
  - (4) Guard band & guard time

**4. Attempt any THREE of the following :****3 × 4 = 12**

- (a) Draw the following data format for bit stream 1100010 :
- (1) Polar RZ
  - (2) Unipolar RZ
  - (3) Bipolar NRZ
  - (4) Split-phase Manchester

- (b) Describe spread spectrum modulation system with the help of suitable diagram.
- (c) With the help of block diagram explain digital communication system.
- (d) Describe working of ADM transmitter with neat block diagram.
- (e) Describe FDMA with suitable diagram.

**5. Attempt any TWO of the following :**

**2 × 6 = 12**

- (a) Obtain Hamming code of 1101 using odd parity. During transmission of this code, if error occurs in MSB, how is it detected ?
- (b) Draw the block diagram of DPCM transmitter & explain its working. State two advantages of DPCM.
- (c) State bandwidth required for BASK, BFSK & BPSK. Also draw waveforms of binary data 10111010 in BASK, BFSK & BPSK modulation.

**6. Attempt any TWO of the following :**

**2 × 6 = 12**

- (a) Justify QPSK is better than BPSK with suitable example & waveforms.
  - (b) State different types of QAM & draw time domain display & constellation diagram of 8-QAM.
  - (c) Compare DSSS & FHSS on the basis of following parameters :
    - (1) Definition
    - (2) Chip rate
    - (3) Modulation
    - (4) Processing Gain
    - (5) Acquisition time
    - (6) Effect of distance
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