

22428

12425

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) Define :
  - (i) Bit Rate
  - (ii) Baud Rate
- (b) Define channel capacity with mathematical expression.
- (c) State sampling theory. Define Nyquist minimum rate of sampling.
- (d) List different Digital Modulation Techniques.
- (e) List the applications of CDMA (Any four).
- (f) State the need of Multiplexing.
- (g) Define the concept of spread spectrum modulation.



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

- (a) State Hartley's law and Shannon Hartley's theorem.
- (b) Describe companding with diagram.
- (c) Draw the block diagram of DPCM transmitter and describe the role of predictor in it.
- (d) Describe BPSK generation with neat block diagram. Also draw BPSK waveform for the data stream 10111010.

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

- (a) A seven bit Hamming code is received as 1110101. Construct the correct code. Assume even parity.
- (b) Describe slope overload distortion and Granular noise with neat diagram.
- (c) Describe CCITT carrier multiplexing hierarchy with suitable diagram.
- (d) Compare FDMA and CDMA on the basis of following points :
  - (i) Bandwidth
  - (ii) Synchronisation
  - (iii) Guard Band
  - (iv) Applications

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

- (a) Draw the following data format for bit stream 10010110 :
  - (i) Unipolar RZ
  - (ii) Bipolar (AMI)
  - (iii) Differential Manchester
  - (iv) Polar Quaternary
- (b) Draw the block diagram of PCM transmitter and state its advantages.

- (c) Draw the block diagram of synchronous TDM and describe the working of the same.
- (d) Compare fast frequency Hopping and slow frequency Hopping.
- (e) Draw block diagram of digital communication system and state function of source encoder and channel encoder.

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

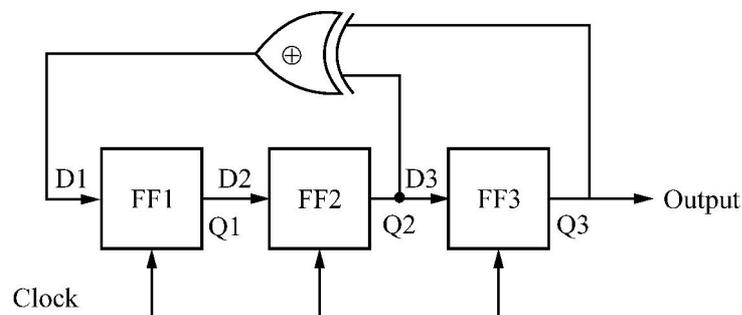
**2 × 6 = 12**

- (a) Generate CRC code for data word 1101101001 by using divisor as 1101. State any two advantages of CRC method.
- (b) Draw the block diagram of 8-QAM transmitter. Also draw constellation diagram for BASK, BFSK, BPSK and QPSK.
- (c) Justify that in DM System, less number of bits are transmitted than PCM system with the help of block diagram and relevant waveform.

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

**2 × 6 = 12**

- (a) Describe the need of M-ary modulation techniques. Also draw the block diagram of M-ary PSK modulation technique and describe its working.
- (b) State the principle of DPSK. Draw the block diagram of DPSK transmitter and receiver along with its waveforms.
- (c) Identify the block diagram shown in Fig. No. 01. Construct and draw the output waveform for the same.



**Fig. No. 01**

