

22428

22232

3 Hours / 70 Marks

Seat No.

--	--	--	--	--	--	--	--

- 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) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (6) Preferably, write the answers in sequential order.

**Marks**

1. Attempt any FIVE of the following :

$5 \times 2 = 10$

- (a) Define the following :
  - (i) Entropy
  - (ii) Information Rate
- (b) State Shannon Hartley's Theorem on channel capacity.
- (c) List two advantages of PCM.
- (d) State any two merits and demerits of Frequency Shift Keying.
- (e) List different types of multiplexing techniques.
- (f) List any two advantages and disadvantages of CDMA system.
- (g) State applications of spread spectrum modulation. (Any **two**)



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

- (a) Draw and explain block diagram of digital communication system.
- (b) State sampling theorem. Explain natural sampling method with circuit arrangement.
- (c) Explain the effect of aliasing with neat waveform. State the method to eliminate aliasing.
- (d) Define ASK. Explain Block Diagram of ASK generation with wave forms.

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

- (a) Encode binary sequence 10110110 using URZ, PNRZ, AMI and split phase Manchester line coding technique.
- (b) Express the need of delta modulation over PCM. Also draw the block diagram of DM Transmitter and explain working of it.
- (c) State the need of multiplexing. Explain TDM technique with relevant diagram.
- (d) Apply the concept of asynchronous multiplexing to draw the schematic diagram for 4-channel system.

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

- (a) Describe working of CRC checker with example.
- (b) Find the Nyquist Rate and Nyquist interval for the following signal :  
$$X(t) = 10 \cos 2000 \pi t. \cos 5000 \pi t$$
- (c) Draw the neat diagram of D.S. hierarchy and explain in brief. Also relate DS and T Lines.
- (d) Describe the working of DSSS transmitter with block diagram.
- (e) A receiver received the following Hamming code 1010101011 with even parity. Find the error in the received code and give the corrected data.

**5. Attempt any TWO of the following :****2 × 6 = 12**

- (a) A discrete memoryless source has an alphabet of five symbols with probabilities for its output as described in table 5.1.

Symbol	S0	S1	S2	S3	S4
Probability	0.15	0.25	0.20	0.10	0.30

Table 5.1

Compute the Huffman code for this source.

Also calculate :

- (i) Average code – word length
  - (ii) Entropy of the source
  - (iii) Code efficiency ( $\eta$ )
- (b) Justify why QAM is a good choice for efficient use of bandwidth ? Draw and explain QAM / QASK transmitter with waveform.
- (c) State drawbacks of DM overcome by ADM. Explain Block diagram of ADM with waveforms.

**6. Attempt any TWO of the following :****2 × 6 = 12**

- (a) ‘QPSK is better than PSK’, illustrate this statement along with block diagram and waveforms of QPSK.
- (b) Describe the reception of BPSK with block diagram. State the mathematical equation for the binary signal obtained at the output.

- (c) For the PN sequence generator shown in Figure 6.1, obtain and draw the PN sequence. Assume initial contents of the shift register are :

$$Q_4 Q_3 Q_2 Q_1 = 1 0 0 1.$$

Explain working of the circuit shown in given Fig. 6.1

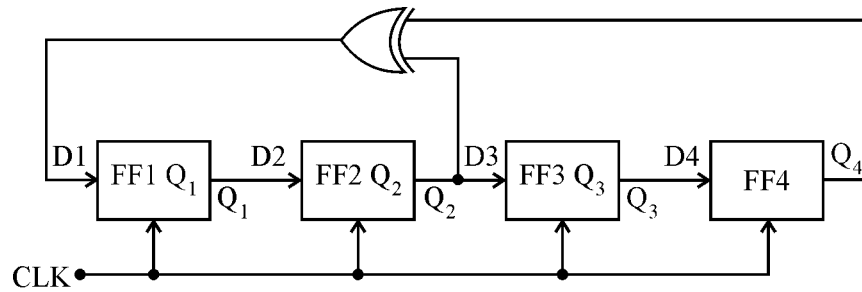


Fig. 6.1