

(3 Hours)

[Total Marks: 80]

- N.B: (1) Question **No.1** is **compulsory**.  
 (2) Answer any **three** from remaining **five** questions.  
 (3) Figures to the **right** indicate **full** marks.  
 (4) Assume the **data** if it is **necessary**.

1. Attempt **any four** of the following. [20]  
 (a) Draw and Explain the Block diagram of Basic communication system.  
 (b) Explain Shannon's Theorem on channel capacity.  
 (c) Draw ASK, FSK, PSK waveforms for data bit sequence 11011001.  
 (d) Explain need for modulation in communication system.  
 (e) Explain the role of AGC in AM reception.

2. (a) Consider a (7,3) code whose Parity check matrix is given below. [10]

$$H = \begin{pmatrix} 0 & 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 1 \end{pmatrix}$$

- (i) Construct syndrome table for signal bit error patterns.  
 (ii) Decode the received code vector  $R_1=0011101$ ,  $R_2=1101110$ .  
 (b) Explain a method of generating DSB-SC AM signal with the help of waveforms. [10]

- 3.(a) Explain PCM transmitter and receiver with the help of neat block diagram. [10]

(b) In a fax transmission of a picture there are  $2.25 \times 10^6$  picture elements in a frame. 12 brightness levels are required for faithful reception. Assuming all these levels are equiprobable, calculate channel bandwidth required to transmit 1 picture in every 3 minutes for a signal to noise ratio of 30dB. If signal to ratio is increased to 40 dB. Calculate new bandwidth. Comment on SNR-BW Trade off for the results obtained in above cases. [10]

4. (a) Derive FM wave equation, plot frequency spectrum of FM wave also explain carson's rule for FM Bandwidth. [10]

(b) Explain regarding BPSK (i) Transmission (ii) Reception (iii) waveform for data bit sequence  $b(t) = 1011001$ . Also plot frequency spectrum. [10]

5. (a) The Generator Polynomial of a (7,4) cyclic code is  $g(x) = 1+x^2+x^3$ . Draw feedback shift encoder. Use this encoder to find code word for the message (0011) in systematic form. [08]

(b) What is Direct and Indirect method of FM generation? Also Explain Armstrong method of FM generation. [12]

6. Write short notes on (**any two**) [20]

- (a) Quantization in pcm system.  
 (b) Power Line Carrier Communication.  
 (c) Convolution codes.  
 (d) Superhetrodyne reciever

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