(Time: 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) Explain the need of modulation communication system.
    (b) Explain Shannon's Theorem on channel capacity.
    (c) Draw ASK, FSK, PSK waveforms for data bit sequence 10101011.
    (d) Explain the significance of modulation index 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 =   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

(i) Construct syndrome table for signal bit error patterns.
(ii) Decode the received code vector R_1=0011101, R2= 1101110.
    (b) Explain a method of generating SSB-SC AM signal with the help of waveforms. **[10]**

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

    (b) In a fax transmission of a picture there are $2.25*10^6$ 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 of for the results obtained in above cases. **[10]**

4. (a) Derive AM wave equation, plot frequency spectrum of AM wave. **[10]**
    (b) Explain regarding B PSK (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) OFC Communication.
    (c) Convolution codes.
    (d) Superhetrodyne reciever

****

88A89FBA80932F83D9895BA53BE76774