







**Answer any FIVE Questions:-**  
**PART C (5 x 14 = 70 Marks)**  
**(Answer not more than 300 words)**

**Q.No. 21 is Compulsory**

21. Discuss the operations performed in a 1-bit form of DPCM and obtain the maximum value of the output signal to noise ratio. CO1 [K<sub>2</sub>]
22. (i) For the systematic (7,4) cyclic code with generator polynomial  $g(x) = 1+x+x^3$ . Find (10) CO6 [K<sub>3</sub>]  
the codeword for the message  $m_1 = (1011)$  and  $m_2 = (0001)$   
(ii) Elaborate symbol synchronization in digital communication system. (4) CO5 [K<sub>2</sub>]
23. Discuss on Gram-Schmidt Orthogonalization procedure and geometric interpretation of signals. CO3 [K<sub>2</sub>]
24. Illustrate a detailed note on a technique in which phase of the carrier takes on one of the four possible equally spaced values. Also obtain its Probability of error. CO4 [K<sub>2</sub>]
25. (i) State the benefits of correlative coding and make a brief note on duo binary signaling. (10) CO2 [K<sub>2</sub>]  
(ii) Consider the input binary sequence 10101100 and draw the NRZ Bipolar, Manchester, NRZ polar and NRZ Unipolar waveforms. (4) CO2 [K<sub>3</sub>]
26. A 1/2 rate convolutional code has the following generators: CO6 [K<sub>3</sub>]  
 $g_1 = [1 \ 1 \ 1], g_2 = [1 \ 0 \ 1]$   
(i) Sketch the encoder diagram (2)  
(ii) Sketch the state diagram (2)  
(iii) Encode the data 10011 using tree diagram. (3)  
(iv) Using Viterbi algorithm decode the received sequence (11,10,11,01,01,01,11) (7)
27. (i) Explain the different types of Quantization and obtain the expression for maximum signal to quantization noise ratio. (10) CO1 [K<sub>3</sub>]  
(ii) With neat diagram elaborate how carrier phase estimation is done in Costas loop. (4) CO5 [K<sub>2</sub>]

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