

Gate 2021 Assignment

EE:1205 Signals and Systems
Indian Institute of Technology, Hyderabad

Abhey Garg
EE23BTECH11202

I. QUESTION EC 34

A digital transmission system uses a (7,4) systematic linear Hamming code for transmitting data over a noisy channel. If three of the message–codeword pairs in this code ($m_i; c_i$) where c_i is the codeword corresponding to the i 'th message m_i , are known to be (1100;0101100), (1110;0022220) and (0110 ; 1000110), then which of the following is a valid codeword in this code?

- A 0110100
- B 1011010
- C 0001011
- D 1101001

II. SOLUTION

Given code is systematic linear hamming code of order (7, 4)

Given message and code word pairs are

1100; 0101100
1110; 0011110
0110; 1000110

The code word is of the form

$c = p_1 p_2 p_3 m_1 m_2 m_3 m_4$
where

$$P_1 = d_1 \oplus d_2 \oplus d_4 \quad (1)$$

$$P_2 = d_2 \oplus d_3 \oplus d_4 \quad (2)$$

$$P_3 = d_1 \oplus d_2 \oplus d_3 \quad (3)$$

$$(4)$$

The code word which satisfies this pattern is 0001011