



Assignment No. 02
Semester: Fall 2022
CS601: Data Communication

Total Marks: 15
Due Date: 24th January 2023

Instructions:

Please read the following instructions carefully before submitting assignment:

You need to use MS word document to prepare and submit the assignment on VU-LMS.

It should be clear that your assignment will not get any credit if:

- The assignment is submitted after due date.
- The assignment is not in the required format (doc or docx)
- The submitted assignment does not open or file is corrupt.
- Assignment is copied (partial or full) from any source (websites, forums, students, etc)

Objectives:

The objective of this assignment is to enhance the learning capabilities of the students about:

- Redundancy
- Block Coding
- Hamming Distance

Question No. 1**(10 marks)**

Suppose in a code-word, we add two redundant bits to each 8-bit data word. Find the number of

1. Valid code-words
2. Invalid code-words

Note: You are required to show all the necessary calculation steps.

Answer

We know that

k called data-word

r called redundant

n called code-word

so, in the given scenario given that 8 data word (i.e., $k=8$) and redundant bit 2 (i.e., $r=2$)

Number of code word cannot give so; we find first number of code word by using formula

$$n = k + r$$

$$n = 8 + 2$$

$$n = 10 \text{ (code word)}$$

for finding total numbers of code word, we applying formula

$$2^n$$

$$2^{10}$$

1024 total number of code word

For finding valid number of code word, we skip redundant bit (2)

$$2^8$$

256 valid code-words

Invalid code-words = Total numbers of code-words – valid code words

We know that Total numbers of code-words is 1024 and valid code-words is 256

So, by put these values in formula we get invalid code-words which is equal to 768

$$\text{Invalid code-words} = 1024 - 256$$

$$\text{Invalid code-words} = 768$$

Question No. 2**(5 marks)**

Calculate the Hamming distance given in the below table for each of the following code words?

Answer

The Hamming distance is a measure of the similarity between two code words, and is defined as the number of positions at which the corresponding bits are different.

Code Words	Hamming Distance
d (10000, 00000)	5
d (10101, 10000)	2
d (00000, 11111)	5
d (00000, 00000)	0
d (000, 011)	2

It is important to note that the Hamming distance can only be calculated between code words of the same length.

