Vidyavardhini's College of Engineering and Technology

Department of Artificial Intelligence & Data Science

AY: 2025-26

Class:	T. E.	Semester:	V
Course Code:	CSC501	Course Name:	COMPUTER NETWORKS

Name of Student:	SHRUTI GAUCHANDRA
Roll No. :	18
Assignment No.:	02
Title of Assignment:	ERROR CORRECTION, DETECTION
Date of Submission:	05/08/25
Date of Correction:	05/08/25

Evaluation

Performance Indicator	Max. Marks	Marks Obtained
Completeness	5	05
Demonstrated Knowledge	3	03
Legibility	2	02
Total	10	10

Performance Indicator	Exceed Expectations (EE)	Meet Expectations (ME)	Below Expectations (BE)
Completeness	5	3-4	1-2
Demonstrated Knowledge Legibility	3	2	1
Legibility	2	1	0

Checked by

Name of Faculty : Mrs. SNEHA YADAV

Signature :

Date : 05/08

SC501.2 Apply communication mechanisms like services, framing, error detection, error correction, multiple access control for flow and error control.

Q1. A layer pure ALOHA network transmits 200-bit frames on a shared channel of 200 kbps. Find the throughput if the system (all station together) produces
a. 1000 frames per second?
b. 500 frames per second?
c. 250 frames per second?

→ ① Frame transmission time (Average) = t is 200 bit / 200 kbps or 1 ms

② The vulnerable time is $2t = 2 \times 1$ ms
$= 2$ ms

③ This means no station should sent 1 ms before or after this station starts transmission.

④ The throughput for pure ALOHA is,
$$\boxed{S = Ge^{-2G}} \quad \text{—— (i)}$$

⑤ The maximum throughput;
$S = 0.184$ when $G = 0.5$

a. If the station produces 1000 frames per second i.e. 1 frame per milisecond.
The load is 1.

Put $G = 1$ in equation (i),

$\therefore S = 1 \times e^{-2 \times 1}$

$= 0.135$

$\therefore \boxed{S = 13.5\%}$

Therefore, throughput is $1000 \times 0.135 = 135$ frames. Only 135 frames out of 1000 would be probably transmitted successfully (survive).

b. If station produces 500 frames per second, i.e. 1/2 frame per milisecond.
The load is $\frac{1}{2}$

Put $G = 1/2$ in equation (i),

$S = \frac{1}{2}(e)^{-1/2 \times 2} = \frac{1}{2}(e)^{-2 \times 1/2}$

$= 0.184$

$\therefore \boxed{S = 18.4\%}$

Therefore, throughput is $500 \times 0.184 = 92$ frames. Only 92 frames out of 500 would be probably transmitted successfully (survive).

c. If the station produces 250 frames per second i.e. 1/4 frame per milisecond.
The load is $\frac{1}{4}$

Put $G = \frac{1}{4}$ in equation (i),

$$\therefore S = \frac{1}{4}(e)^{-2 \times \frac{1}{4}}$$

$$= 0.152$$

$$\therefore \boxed{S = 15.2\%}$$

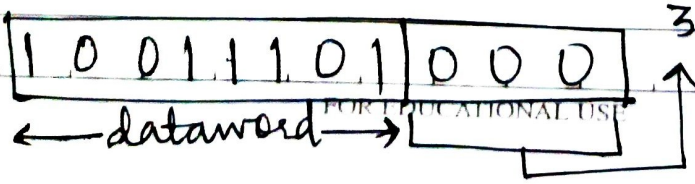
Therefore, throughput is $250 \times 0.152 = 38$ frames
Only 38 frames out of 250 would be probably transmitted successfully (survive).

Q2. A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is X^3+1.

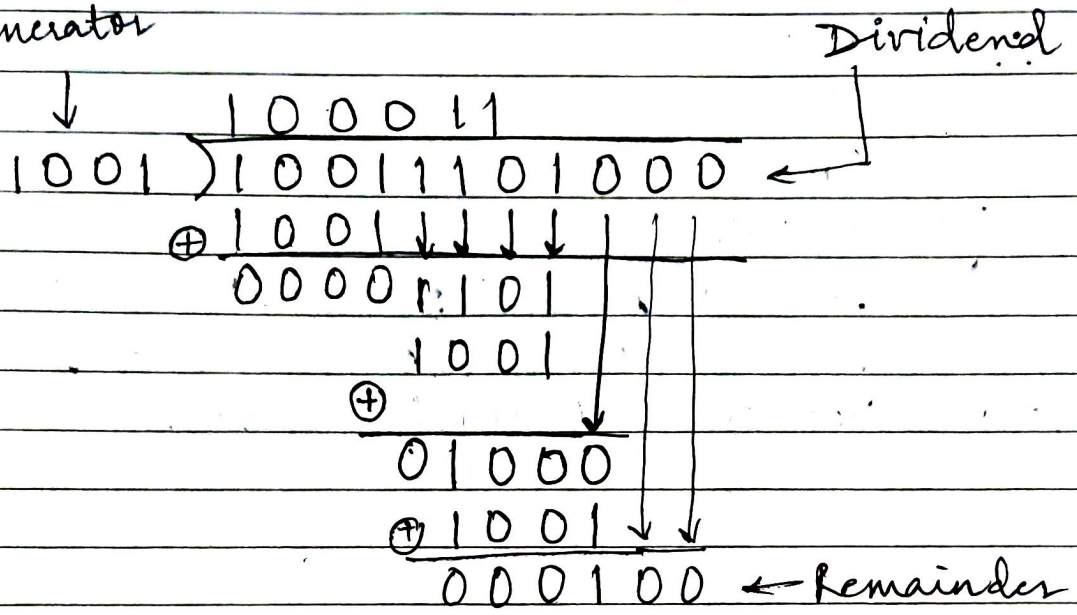
1. What is actual bit string transmitted?
2. Suppose the third bit from the left is inverted during transmission, How will receiver detect the error.

→ Given: Data Word (Bit String): 10011101
Generator Polynomial: x^3+1
: x^3+0x^2+0x+1
: 1001
= n

Step 1: Obtain the Dividend.
Dividend = Data word + (n-1) zeroes.



Step 2: Carry Out Long division.



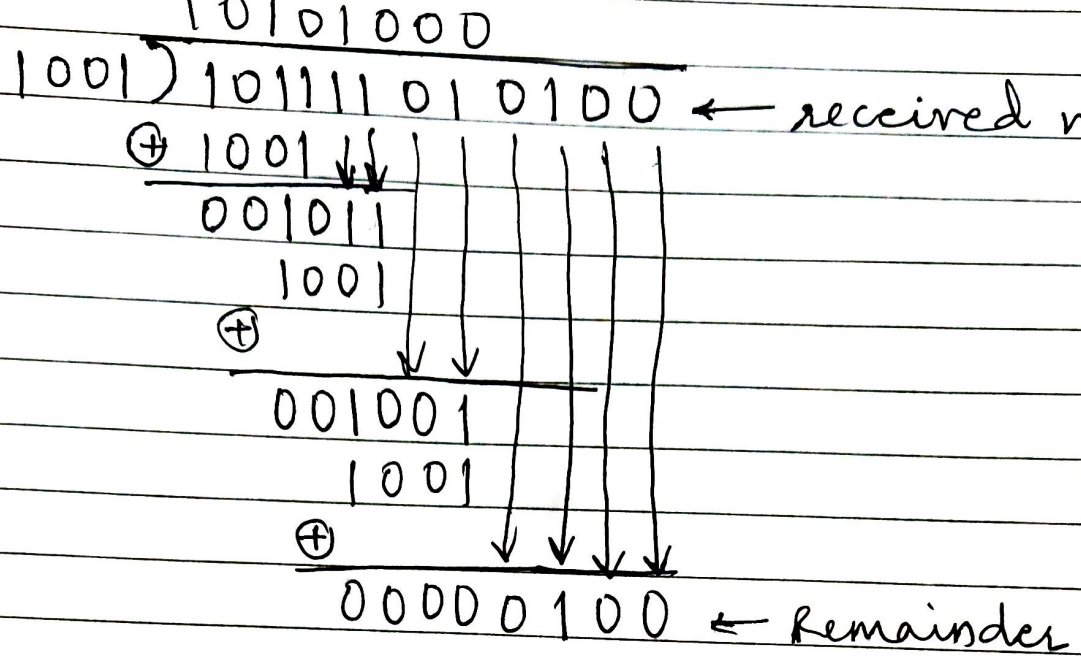
Step 3: Obtain actually transmitted bit stream
Transmitted word is obtained by writting data word followed by remainder.

Transmitted word = [1001 1101 | 0100]
← Data word → Remainder

Error detection:
Step 4: Write erroneous received word
The received word = 10(1)1 1101 0100

↑ error bit (3rd bit from left is inverted).

At receiver, word is divided by same divider used at transmitter i.e. 1001



A non zero remainder indicates that there is an error in received codeword.