

CSE-1003

DLD LABFAT

BY

- ASHUTOSH ARDU

20BRS1262

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Q) Perform a conversion method strongly follows EX-OR gate operation between binary bits. They are used for error correction in digital communication as well as to minimize errors in converting analog signal to digital signals?

AIM:- To perform error correction using X-OR gates.
(Using 7bit Hamming code Correction method)
(Using Even parity check)

PROCEDURE:-

- Open Lt spice
- Select the component button and search 'xor', insert '9' xor gates for Hamming code correction
- Now, again go back to component section and search 'voltage' and enter '7' voltages for checking 7 bits.
- Use the labels to get the output.
- In the end go to 'Simulate' and tap 'edit simulation End' and select 'DC op pnt' and

click 'ok'.

- Now, have you have completed your circuit and now click on the run button receive the output.

Explanation :-

7 bit Hamming Code
(even parity)

$D_7 \ D_6 \ D_5 \ P_4 \ D_3 \ P_2 \ P_1$

$$\text{Even parity} \left\{ \begin{array}{l} P_1' \Rightarrow D_3 D_5 D_7 \\ P_2' \Rightarrow D_3 D_6 D_7 \\ P_4' \Rightarrow D_3 D_6 D_7 \end{array} \right.$$

if $P_i = P_i'$ output '0'

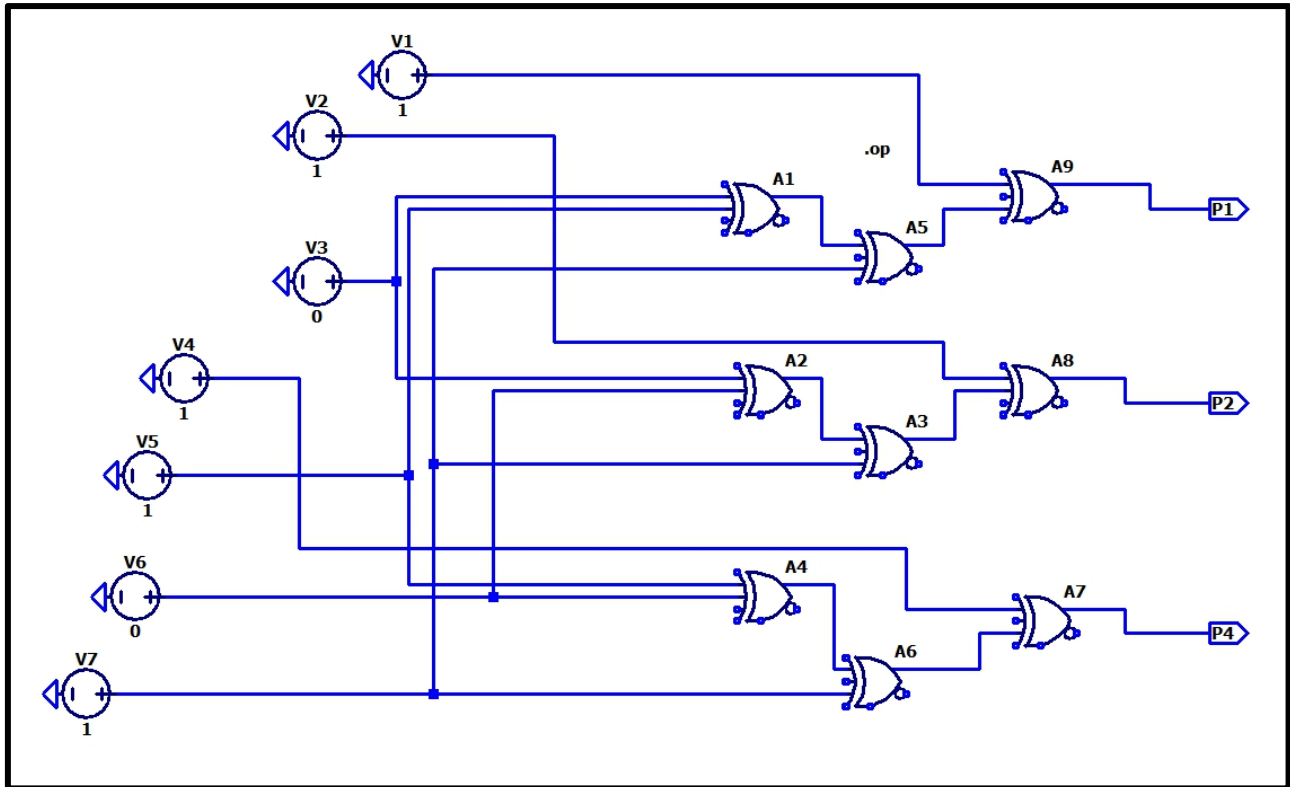
else $P_i \neq P_i'$ output '1'

Hence, the bit at position

$P_4 \ P_2 \ P_1$
 $(P_4' \ P_2' \ P_1')_2$

needs to be corrected $()_{10}$

CIRCUIT



OUTPUT

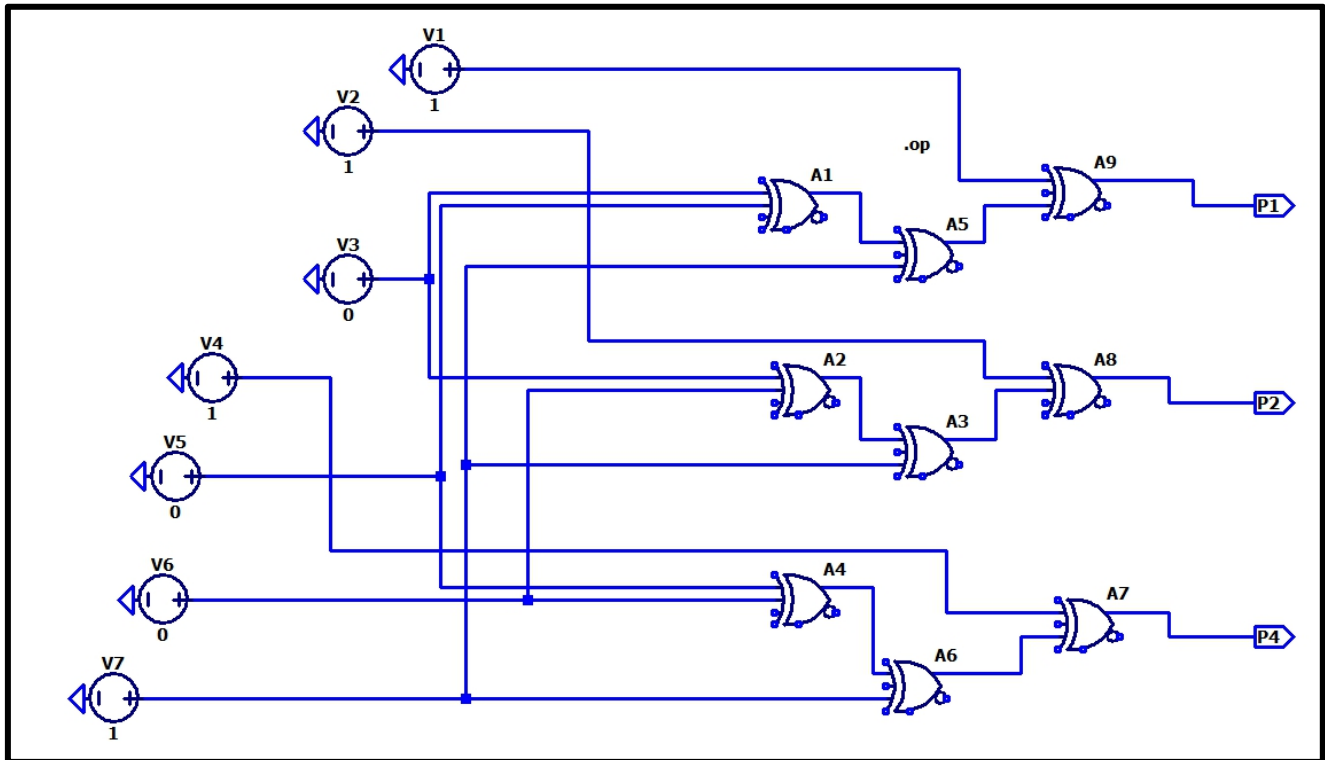
--- Operating Point ---

V(n003):	0	voltage
V(n005):	1	voltage
V(n004):	1	voltage
V(n007):	1	voltage
V(n006):	0	voltage
V(n001):	1	voltage
V(n002):	1	voltage
V(n010):	0	voltage
V(n009):	0	voltage
V(n011):	1	voltage
V(n012):	1	voltage
V(n013):	0	voltage
V(n008):	1	voltage
V(p4):	1	voltage
V(p2):	0	voltage
V(p1):	1	voltage
I(V7):	0	device_current
I(V6):	0	device_current
I(V5):	0	device_current
I(V4):	0	device_current
I(V3):	0	device_current
I(V2):	0	device_current
I(V1):	0	device_current
I8(A9):	-0	device_current
I7(A9):	0	device_current
I8(A8):	-0	device_current
I7(A8):	0	device_current
I8(A7):	-0	device_current
I7(A7):	0	device_current

AS YOU CAN SEE IN THE ABOVE PHOTO THE BIT AT POSITION
101 (P4.P2.P1) IS CORRUPTED.

SO NOW WE CORRECT THAT BIT BY FLIPPING IT

NOW WE FLIP V5 FROM 1 TO 0



NOW AS YOU CAN SEE AS WE FLIPPED V5 THE
HAMMING CODE IS NOW CORRECT, THAT IS THE REASON

WE GOT (P4, P2, P1) AS 000

MEANING NO BIT IS CORRUPTED



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* C:\Users\Ghost\OneDrive - vit.ac.in\Documents\LTspiceXVII\rough.asc
--- Operating Point ---
V(n003):      0      voltage
V(n005):      0      voltage
V(n004):      0      voltage
V(n007):      1      voltage
V(n006):      1      voltage
V(n001):      1      voltage
V(n002):      1      voltage
V(n010):      0      voltage
V(n009):      0      voltage
V(n011):      1      voltage
V(n012):      0      voltage
V(n013):      1      voltage
V(n008):      1      voltage
V(p4):        0      voltage
V(p2):        0      voltage
V(p1):        0      voltage
I(V7):        0      device_current
I(V6):        0      device_current
I(V5):        0      device_current
I(V4):        0      device_current
I(V3):        0      device_current
I(V2):        0      device_current
I(V1):        0      device_current
I8(A9):       -0      device_current
I7(A9):        0      device_current
I8(A8):       -0      device_current
I7(A8):        0      device_current
I8(A7):        0      device_current
```

RESULT AND INFERENCE

AS FOR THE RECEIVED '1 1 0 1 1 0 1' AFTER ERROR CHECKING THE CIRCUIT THE BIT AT THE POSITION 1 0 1 (5) IS CORRUPTED.

SO V5 SHOULD FLIPPED TO 0 INSTEAD OF 1.