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Lab Manual 6th

* Experiment:
  - Full subtractor
  - half subtractor

* Objective

  How to make a subtractor using different logic gates ICs.

* Equipments required for experiment:
  - Electricity / Battery
  - Wires
  - Bread Board
  - logic gates
  - Digital experiment board.

* Software for simulation:

  Multism

  Logicly

* Back Grand:

  It is an electric circuit

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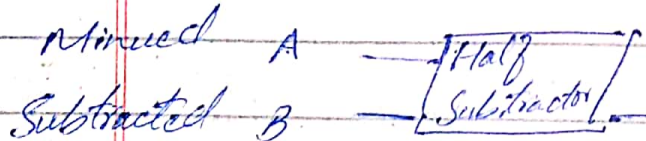
which provides difference b/w two binary numbers & provides borrow as output

* Subtractor types:
  - Full Subtractor
  - half subtractor

* Half subtractor:

Half subtractor produces difference b/w two binary bits at the inputs and also produces an output (borrow) to indicate if a 1 has been borrowed



A	B	D	Borrow
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

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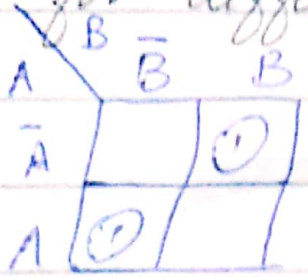
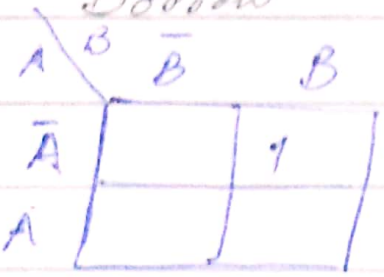
K-Map for difference (D):-



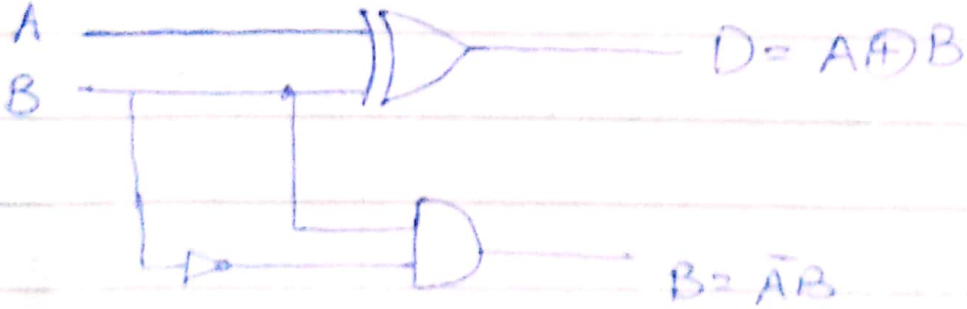
$D = A \oplus B$

K-Map for Borrow



Borrow = $\bar{A} \cdot B$

Circuit Diagram



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K-Map (full subtractor)

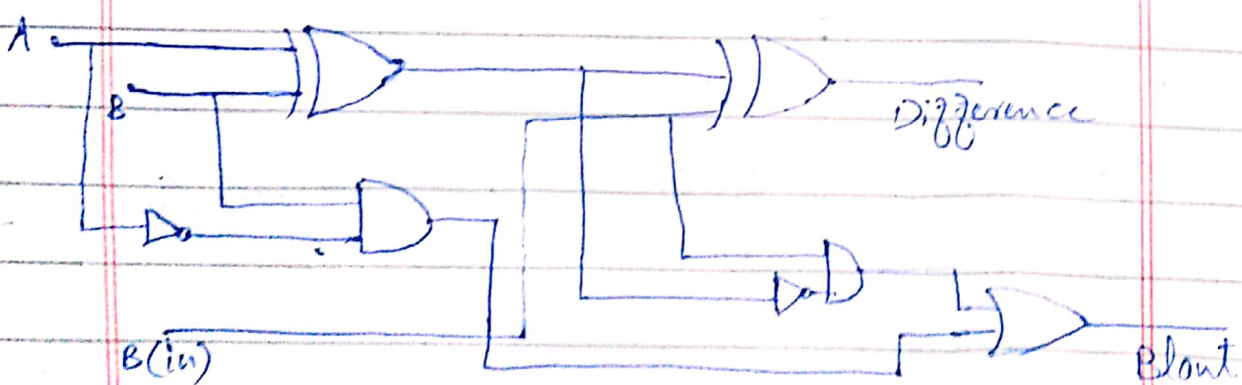
A \ B(in)	00	01	11	10
0	0	1	0	1
1	1	0	1	0

The equations for the difference as well as B(in) are mentioned below

A \ B(in)	00	01	11	10
0	0	1	1	1
0	0	0	1	0

$D = A'B'Bin + AB' + Bin + A'BBin + ABBin$ for borrow expression

$B(out) = A'Bin + A'B + BBin$



Conclusion

After performing above experiment we understood the designing and processing of Half and full subtractors. And its application and uses in circuits

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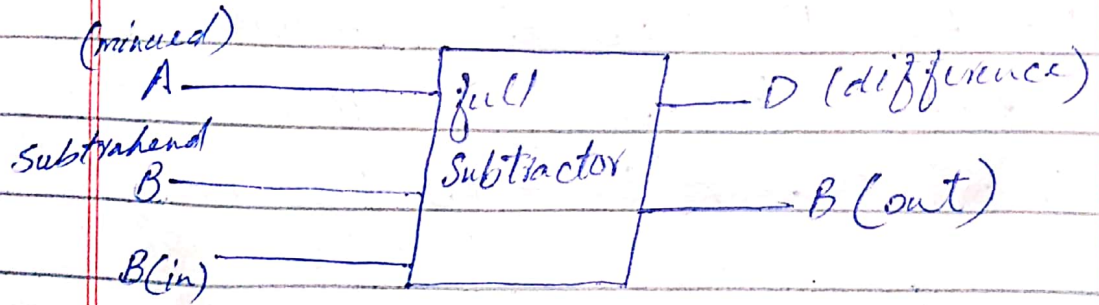
Full subtractor

A full subtractor is a combination circuit that performs subtraction of two bits, one is minued & other is subtrahend, taking two into account borrow of previous adjacent lower minued bit. This circuit has three inputs and two outputs



A	B	B(in)	D	B(out)
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1