DIGITAL ELECTRONICS 20-21

Supervision 1

Lectures: Introduction, Logic Minimisation, Binary Adders

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1. Explain briefly the following terms:

   i. Logic/Binary/Boolean variable
   ii. Logic gate
   iii. Logic function

2. There are three fundamental logical operations, from which all the logic functions can be derived? For each one, what is its symbol, truth-table and boolean algebraic expression? Can you think of four more (combined gates)?

3. Can you describe and give an example of a logic function with more than 3 logic gates (symbols, truth-table and boolean algebraic expression)?

4. Boolean algebra laws and De Morgan's theorems.

   Try to answer questions 1-7 from the online document example sheet "examples_19.pdf".

5. For the following Karnaugh maps:

   i. Write down the canonical SOP expression (summing the minterms)
   ii. Minimise the logic functions
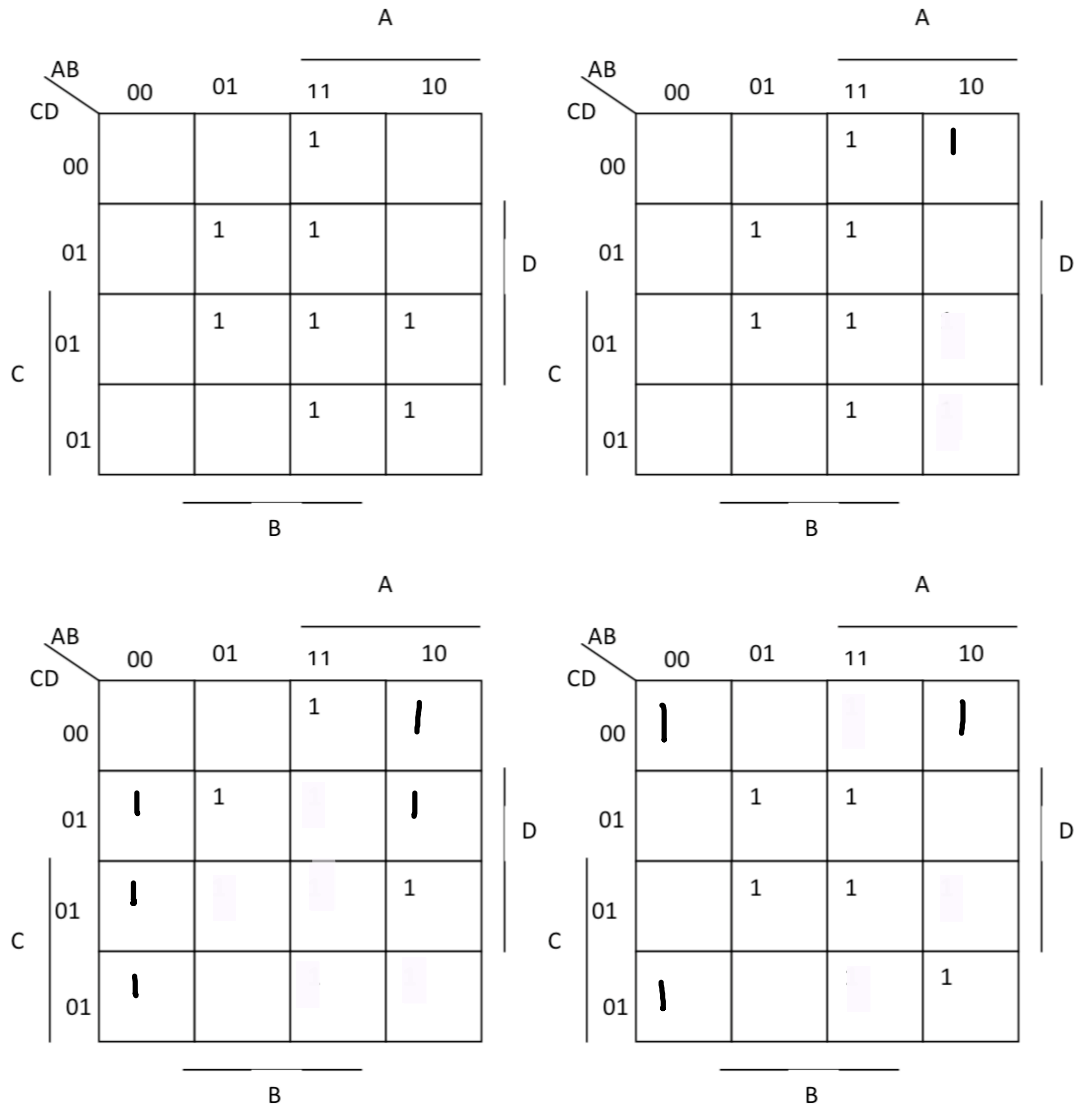
iii.   What about the POS for the following K-map
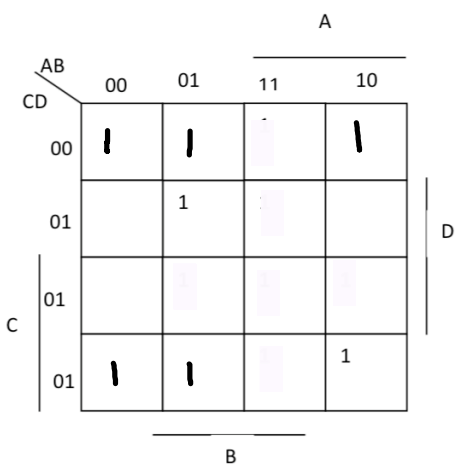
6. Use the Quine-McCluskey method to minimize the following logic function:

   $F(A, B, C, D) = \Sigma m(0, 2, 5, 6, 7, 8, 10, 12, 13, 14, 15)$

7. What distinguishes the meanings of a half adder's inputs and outputs from a full-adder's? Draw the gate diagram of a half and full adder.