COMS12200
Introduction to Computer Architecture

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TB1 review

The viva

- 15 minute oral exam.

The viva

- 15 minute oral exam.
- One examiner (Dan, Cian or David) and one student at a time.
- The audio will be recorded for University records, but we will not use it for grading.
- We will ask you questions on 3 topics (from list on next slide).
- You get to the select the first topic (from the list).
- All examiners have identical question sheets, but each student will get asked a unique subset of questions.
- You will respond verbally, and you can write on a piece of paper if needed.
- No notes allowed (“closed book”).
- There won’t be a computer or any Build-a-comp boards in the room either.
- Don’t be nervous!

The viva

Topics

1. Boolean algebra, number representation, and computer arithmetic.
2. Physical design of logic components (e.g., logic gates from transistors)
3. Use of combinatorial logic components
4. Use of sequential logic components
5. Instruction execution; control and data paths
6. Machine types and memory paradigms

The viva

Topics

Dan's part

1. Boolean algebra, number representation, and computer arithmetic.
2. Physical design of logic components (e.g., logic gates from transistors)
3. Use of combinatorial logic components
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Cian's part

5. Instruction execution; control and data paths
6. Machine types and memory paradigms

Topic 1 example questions

Boolean algebra, number representation, and computer arithmetic.

The Boolean expression

$$(x \vee y) \vee (x \wedge z)$$

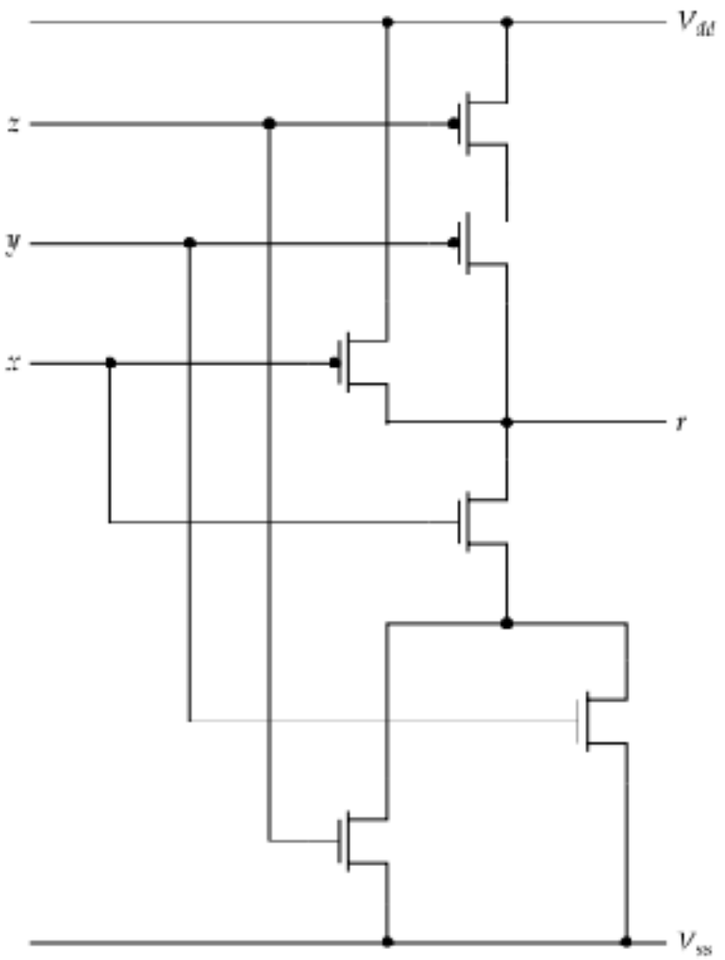
is equivalent to which of the following alternatives?

A: $(x \vee y) \wedge (x \vee z)$
B: $(x \vee y) \wedge z$
C: $(x \vee y) \wedge (x \wedge z)$
D: $x \vee y$
E: $(x \wedge y) \vee x$

Topic 2 example questions

Physical design of logic components (e.g., logic gates from transistors)

Consider the following organisation of MOSFET transistors



which implements a 3-input Boolean function $r = f(x, y, z)$. *Which* function, from the following, do you think it matches?

A: $r = x \wedge y \wedge z$
B: $r = x$
C: $r = \neg(x \wedge (y \vee z))$
D: $r = x \wedge (y \vee z)$
E: $r = x \vee y \vee z$

Topic 3 example questions

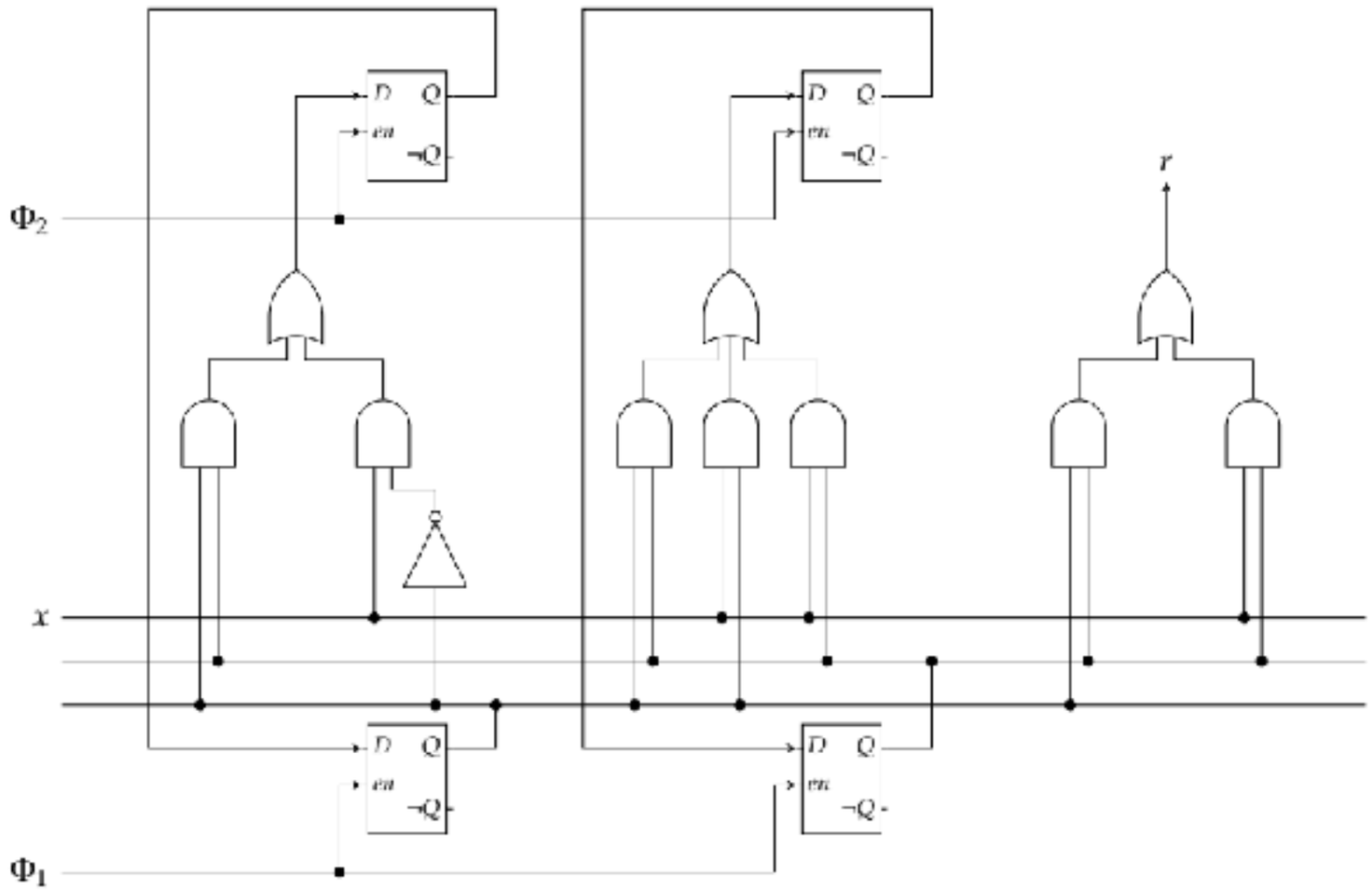
Use of combinatorial logic components

Imagine you want to design an 8-input, 8-bit multiplexer. Rather than do so from scratch, you intend to form the design using multiple instances of an existing 2-input, 1-bit multiplexer component. How many do you need?

A: 1
B: 8
C: 24
D: 40
E: 56

Topic 4 example questions

Use of sequential logic components



Consider the two D-type latches at the bottom of the diagram, which form a 2-bit register. Imagine the value stored in this register is expressed as a 2-bit integer: when the implementation is initially powered-on, is this value equal to

A: $00_{(2)}$
B: $01_{(2)}$
C: $10_{(2)}$
D: $11_{(2)}$
E: any of the above

Topic 5 example questions

Instruction execution; control and data paths

Consider the sequence of instructions needed to implement an if/else statement. Explain, with a written example, where the branch instructions occur. Indicate which branches are conditional and which are unconditional.

Topic 6 example questions

Machine types and memory paradigms

What is a stack machine?

And what are its strengths and weaknesses as compared with a register machine?

See you in 2018