

Exam Introduction to Computer Engineering (ET4246), 31/10/03, 9.00-11.00

General information:

- Exam format: Multiple-Choice, 30 questions, **only 1 correct answer** per question
- Fill the chosen answer slots completely in (by a dark pen or pencil)
- Only fill in the answer form at the end in order to prevent mistakes
- **DO NOT** make corrections on the answer form – ask for a new one instead
- Not answering a question works against you – guessing/gambling is still better
- A question is automatically counted as wrong if more than one answer is filled in
- Do not forget to enter your student number (both in digits and in designated slots)
- Only the answer form has to be handed in at the end
- Do not forget to put your signature on the answer form
- The correct answers will be published on the course website at a later time
- Good Luck!

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Question 1:

Considering VLSI chips design verification and testing, which of the following holds?

- A. Verification is done after and testing before fabrication.**
- B. Testing is done after and verification before fabrication.**
- C. Both are done after fabrication.**
- D. Both are done before fabrication.**

Question 2:

If you have to make a selection between different computer systems, which is the best choice?

- A. The fastest.**
- B. The cheapest.**
- C. The system with the best 'price-performance ratio'.**
- D. Depending on the situation, any of the above can apply.**

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Question 3:

The following statements are made:

- I: Placing is used to determine the module position on a chip.**
- II: Routing ensures the connectivity between all modules in a circuit.**

Given the above two statements, which answer is correct?

- A. Both statements are incorrect.**
- B. Only statement 1 is correct.**
- C. Only statement 2 is correct.**
- D. Both statements are correct.**

Question 4:

Code generation:

- 1. Produces relocatable code**
- 2. Deals with ISA resources.**

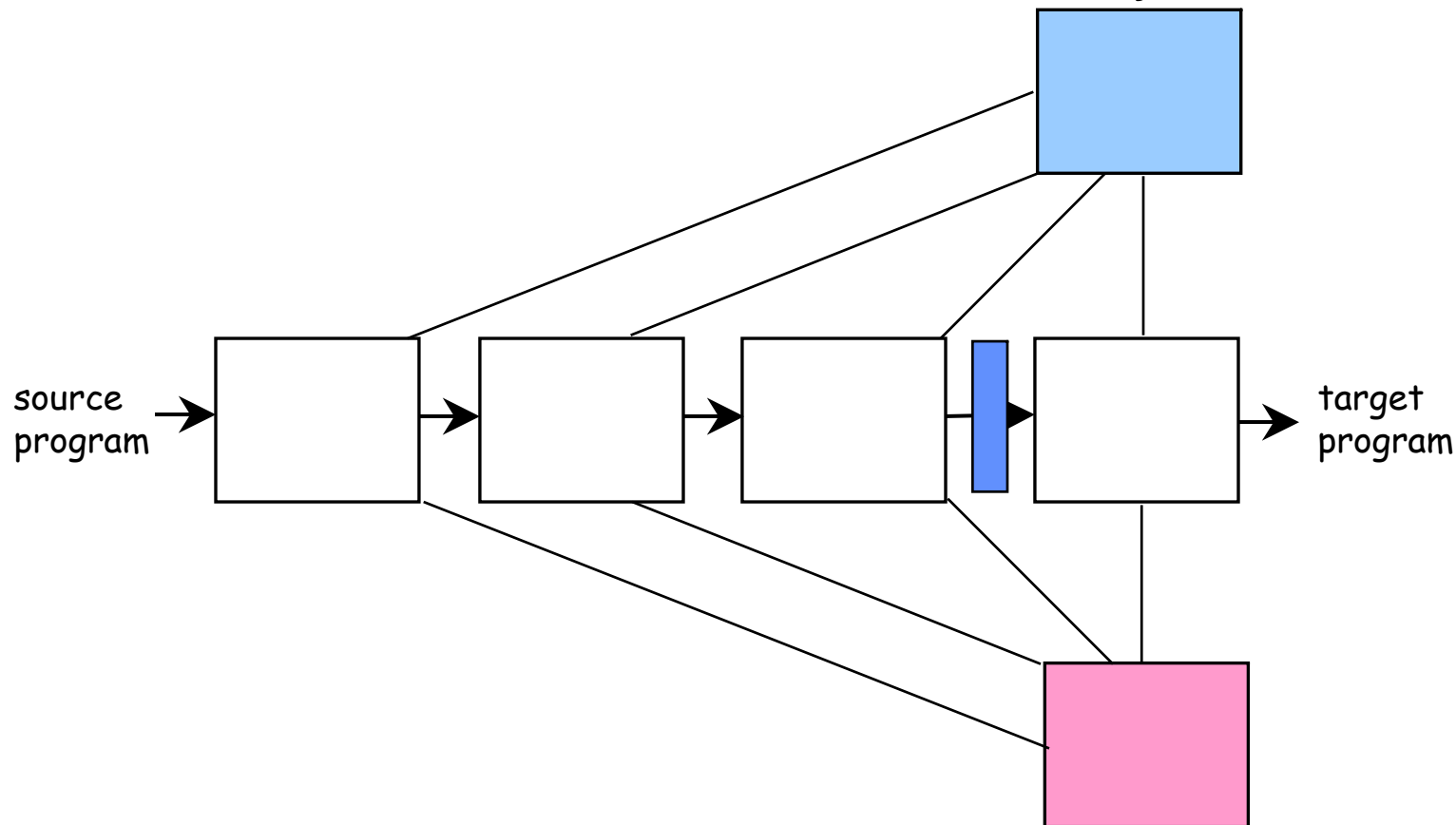
Which answer is correct?

- A. Both statements are incorrect.**
- B. Only statement 1 is correct.**
- C. Only statement 2 is correct.**
- D. Both statements are correct.**

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Question 5: In compilation, lexical analysis is performed:

- A. As the first step of the compilation.
- B. Immediately after syntax analysis.
- C. After code generation.
- D. At the same time as with the semantic analysis.



Exam Introduction to Computer Engineering (ET4246), 31/10/03, 9.00-11.00**Question 6:**

The following two statements are made:

- I: Lexical Analysis recognizes tokens in the program text.
- II: Syntax Analysis groups tokens into hierarchical groups.

Given the above two statements, which answer is correct?

- A. Both statements are incorrect.
- B. Only statement 1 is correct.
- C. Only statement 2 is correct.
- D. Both statements are correct.

Question 7:

Someone swaps two neighboring positions in a hexadecimal number. As a result the number becomes 1200 (decimal) bigger.

In case one of the numbers was “2”, the second number is ?

- A. 7.
- B. 8.
- C. 9.
- D. A.

Exam Introduction to Computer Engineering (ET4246), 31/10/03, 9.00-11.00**Question 8:**

The following two statements are made:

- I: Interpreted programs run faster than compiled ones on the same computer.
II: A program written to be interpreted can not be compiled.

Given the above two statements, which answer is correct?

- A. Both statements are incorrect.
- B. Only statement 1 is correct.
- C. Only statement 2 is correct.
- D. Both statements are correct.

Question 9:

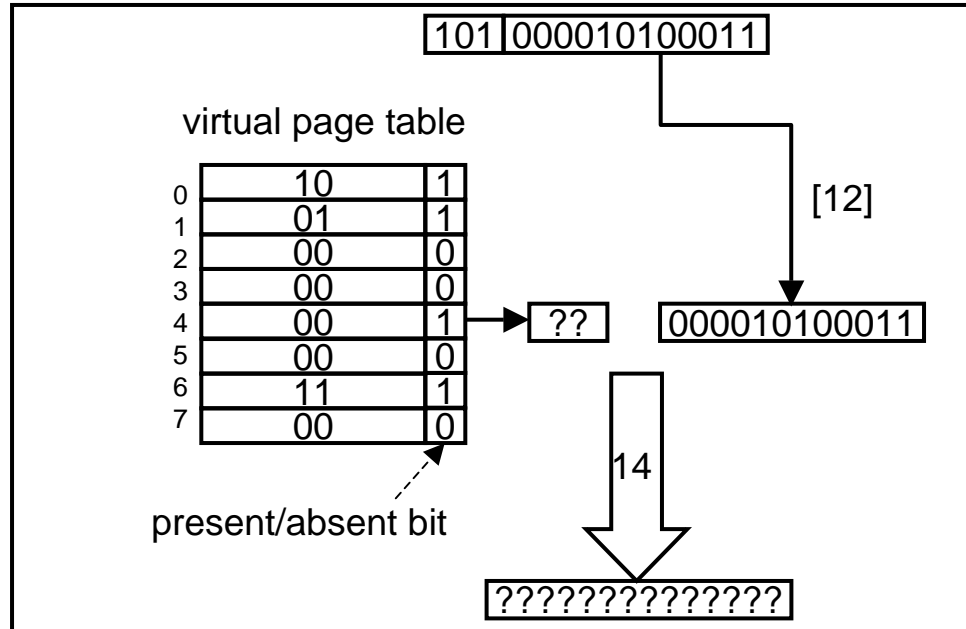
The following two statements are made:

- I: A formal language consists of start, terminal and non-terminal symbols and set of syntactic equations.
II: In addition to programming languages, also the natural languages can be formally defined with mathematical precision.

Given the above two statements, which answer is correct?

- A. Both statements are incorrect.
- B. Only statement 1 is correct.
- C. Only statement 2 is correct.
- D. Both statements are correct.

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Question 10:

The processor sends the virtual address **110000010100011** to the Memory Management Unit (MMU). Which of the following physical addresses will be generated by the MMU?

- A. 10000010100011
- B. 01000010100011
- C. 11000010100011
- D. None of the above, because the requested virtual page is not present

Exam Introduction to Computer Engineering (ET4246), 31/10/03, 9.00-11.00**Question 11:**

Four processes run in parallel and non-prioritized Round-Robin scheduling mechanism is applied by the Operating System. What amount of the system time each process will be running (approximately)?

- A. 25%
- B. 75%
- C. 33%
- D. None of the above, since the idle time depends on the process priorities.

Question 12:

Which of the following are *main* functions of an operating system:

1. easy programming interface and managing hardware resources.
2. providing high security level.

The correct answer is?

- A. None of them.
- B. First one (1).
- C. Second one (2).
- D. Both (1 and 2).

Exam Introduction to Computer Engineering (ET4246), 31/10/03, 9.00-11.00**Question 13:**

The following two statements are made:

- I: Realization materializes the method by using the available means.
II: On Architectural level the method to achieve the system function is established.

Given the above two statements, which answer is correct?

- A. Both statements are incorrect.
- B. Only statement 1 is correct.
- C. Only statement 2 is correct.
- D. Both statements are correct.

Question 14:

The following two statements are made:

- I: An Architecture can have many different (correct) implementations.
II: The vertical design sub-division in Architecture, Implementation and Realization helps the design process.

Given the above two statements, which answer is correct?

- A. Both statements are incorrect.
- B. Only statement 1 is correct.
- C. Only statement 2 is correct.
- D. Both statements are correct.

Exam Introduction to Computer Engineering (ET4246), 31/10/03, 9.00-11.00**Question 15:**

The following table with electrical levels corresponds to a logic gate. The inputs are *a* and *b* and the output is *Y*.

Which Boolean function does this logic gate, assuming positive logic?

- A. a NAND b
- B. a NOR b
- C. a OR b
- D. a AND b

a	b	Y
0 V	0 V	5 V
0 V	5 V	0 V
5 V	0 V	0 V
5 V	5 V	0 V

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Question 16:

How many bits form one standard ASCII character ?

- A. 32 bits.**
- B. 16 bits.**
- C. 8 bits.**
- D. 7 bits.**

Question 17:

Which logic component is used to perform binary arithmetic operations?

- A. Decoder.**
- B. ALU.**
- C. Flip-Flop.**
- D. Register.**

Exam Introduction to Computer Engineering (ET4246), 31/10/03, 9.00-11.00**Question 18:**

The following two statements are made:

I: Any two computers can perform the same computations if infinite time and data storage are available.

II: Given a program and its input, it can be proven that this program will stop after processing the input data.

Given the above two statements, which answer is correct?

- A. Both statements are incorrect.
- B. Only statement 1 is correct.
- C. Only statement 2 is correct.
- D. Both statements are correct.

Question 19:

A computer has a 16-bit wide memory address register (MAR) and 32-bit wide memory data register (MDR) in direct addressing mode.

How much memory can this computer address?

- A. 64 kilobytes.
- B. 128 kilobytes.
- C. 256 kilobytes.
- D. None of the above.

Exam Introduction to Computer Engineering (ET4246), 31/10/03, 9.00-11.00**Question 20:**

Suppose that the Little Man Computer has been implemented as a 16-bit binary machine. The opcodes (0 through 8) will be implemented in binary and will not take more bits than needed.

How many mailboxes can such binary machine accommodate?

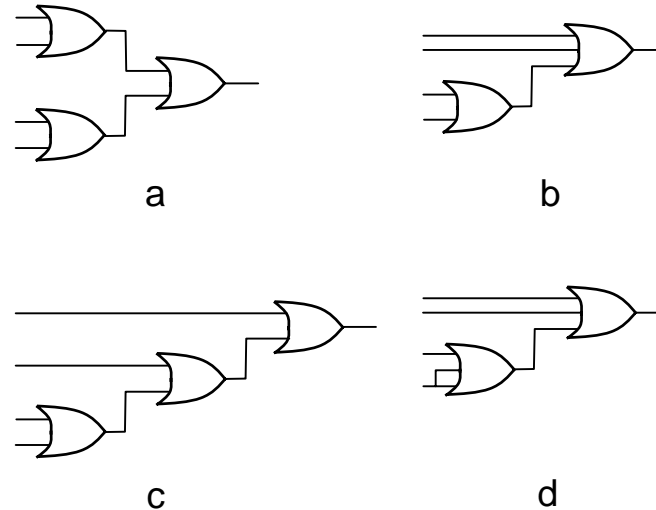
- A. 2^{13} .
- B. 2^{12} .
- C. 100.
- D. None of the above.

Question 21:

Which of the following design styles shows worst design time?

- A. Custom.
- B. Cell-based.
- C. Pre-diffused.
- D. Pre-wired.

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Question 22:

Given that the area and the delay of the logic gates is equal to the number of inputs, e.g. 2-input gate has the delay of 2 and takes area of 2.

Which of the above implementations has the minimum delay?

- A. A
- B. B
- C. C
- D. D

Exam Introduction to Computer Engineering (ET4246), 31/10/03, 9.00-11.00**Question 23:**

The following two statements are made:

- I: Semantic rules are used in code generation stage.
- II: Finite automata are used to recognize tokens at semantic analysis stage.

Given the above two statements, which answer is correct?

- A. Both statements are correct.
- B. Only statement 1 is correct.
- C. Only statement 2 is correct.
- D. Both statements are incorrect.

Question 24:

Considering high level (HLL) and low level (LLL) languages the following statements are made:

- I: HLL are suitable for humans to instruct computers.
- II: A HLL can instruct a computer to compute more than any LLL language.

Given the above two statements, which answer is correct?

- A. Both statements are incorrect.
- B. Only statement 1 is correct.
- C. Only statement 2 is correct.
- D. Both statements are correct.

Exam Introduction to Computer Engineering (ET4246), 31/10/03, 9.00-11.00**Question 25:**

Two numbers -74 and $+35$ are added in two's-complement representation using an 8-bit wide full-adder.

How many internal carries occur?

- A. 3.
- B. 4.
- C. 5.
- D. 6.

Question 26:

The following statements are made in general:

I: Placement problem is much easier than routing problem.

II: The physical design of a chip is done following the sequence:
Floorplanning -> Partitioning -> Placement -> Routing

Given the above two statements, which answer is correct?

- A. Both statements are incorrect.
- B. Only statement 1 is correct.
- C. Only statement 2 is correct.
- D. Both statements are correct.

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Question 27:

In 'big endian' addressed computers, the lowest memory address of a word is used for:

- A. The last register in the register file.
- B. The most significant byte.
- C. The least significant byte
- D. None of the above.

Question 28:

FPGA chips are an example of:

- A. Pre-wired designs.
- B. Cell-based designs.
- C. Pre-diffused designs.
- D. None of the above.

Exam Introduction to Computer Engineering (ET4246), 31/10/03, 9.00-11.00**Question 29:**

The following statements about compilers and interpreters are made:

I: Both perform lexical, syntactic, and semantic analysis on the source program.

II: Compilers directly execute programs while interpreters synthesize programs.

Given the above two statements, which answer is correct?

- A. Both statements are incorrect.
- B. Only statement 1 is correct.
- C. Only statement 2 is correct.
- D. Both statements are correct.

Question 30:

The following statements are done about OS (MMU) page table:

1. It does **NOT** vary with the time.
2. It performs dynamic address translation.
3. It maps the virtual address space into the physical address space.

How many statements are true?

- A. None.
- B. One.
- C. Two.
- D. All of them.

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1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
15	A	B	C	D

16	A	B	C	D
17	A	B	C	D
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D
21	A	B	C	D
22	A	B	C	D
23	A	B	C	D
24	A	B	C	D
25	A	B	C	D
26	A	B	C	D
27	A	B	C	D
28	A	B	C	D
29	A	B	C	D
30	A	B	C	D