

## Course outline

How does an NPTEL online course work?

Prerequisite: Week 0

**Week1:** Introduction to C-based VLSI Design

**Week2:** C-Based VLSI Design: Basic Scheduling

**Week3:** C-Based VLSI

Design: List Based Scheduling

**Week 4:** C-Based VLSI

Design: Advanced Scheduling

**Week 5:** C-Based VLSI

Design: Allocation and Binding

**Week 6:** C-Based VLSI

Design: Allocation, Binding, Data-path and Controller Generation

**Week 7:** C-Based VLSI

Design: Efficient Synthesis of C Code

**Week 8:** C-Based VLSI

Design: Hardware Efficient C Coding

**Week 9:** C-Based VLSI

Design: Impact of Compiler Optimizations in Hardware

**Week 10:** Verification of High-level Synthesis

**Week 11:** Securing Design with High-level Synthesis

• Lec 1: Introduction to Hardware Security

• Lecture Notes for Lec 1: Introduction to Hardware Security

• Lec 2: HLS for Security

• Lecture Notes for Lec 2: HLS for Security

• Lec 3: Attacks on RTL Logic locking

• Lecture Notes for Lec 3: Attacks on RTL Logic locking

○ Quiz: Week 11: Assignment 11

● Week 11: Feedback Form

● Solution: Assignment 11

**Week 12:** Introduction to EDA and Recent Advances in C-Based VLSI Design

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# Week 11: Assignment 11

The due date for submitting this assignment has passed.

Due on 2021-10-13, 23:59 IST.

As per our records you have not submitted this assignment.

- 1) Consider the following statements:

1 point

$z = k1 ? (x - y) : (y - x);$   
  $a = !k2 ? (b * c) : (b / c);$   
  $t = k3 ? (s - r) : (s + r);$

Operations in the above statements are locked using a 3-bit key  $< k1 \ k2 \ k3 >$ , which is  $< 1 \ 0 \ 0 >$ . What will be the operations performed for the given keys?

- $z = y - x; a = b / c; t = s - r;$   
  $z = x - y; a = b * c; t = s - r;$   
  $z = x - y; a = b * c; t = s + r;$   
  $z = y - x; a = b / c; t = s + r;$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$z = x - y; a = b * c; t = s + r;$

- 2) Consider the following statements:

1 point

$a = k1 ? (b * c) : (b / c);$   
  $t = !k2 ? (s + r) : (s - r);$   
  $x = !k3 ? (y + z) : (y - z);$

Operations in the above statements are locked using a 3-bit key  $< k1 \ k2 \ k3 >$ . For what values of keys the following operations mentioned below will be performed?

- $a = b / c;$   
  $t = s + r;$   
  $x = y - z;$   
  $< 0 \ 0 \ 0 >$   
  $< 0 \ 0 \ 1 >$   
  $< 0 \ 1 \ 0 >$   
  $< 1 \ 1 \ 0 >$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$< 0 \ 0 \ 1 >$

- 3) Consider the following piece of code:

1 point

```
x = 20, y = 5;
if (((x - y) > 10) XOR key1)
{
    z = !key2 ? (x / y) : (x - y);
}
else
{
    z = key2 ? (x + y) : (x * y);
}
```

To get a final value of  $z$  as 100, what should be the key values  $< \text{key1} \ \text{key2} >$ ?

- $< 0 \ 0 >$   
  $< 1 \ 1 >$   
  $< 0 \ 1 >$   
  $< 1 \ 0 >$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$< 1 \ 0 >$

- 4) Consider the following piece of code:

1 point

```
a = 10, b = 2, key1 = 1, key2 = 0
if ((a > b) XOR key1)
{
    c = key2 ? (a + b) : (a * b);
}
else
{
    c = !key2 ? (a - b) : (a / b);
}
```

What will be the value of  $c$  at the end of the execution of the following code snippet?

- 12  
 20  
 8  
 5

No, the answer is incorrect.

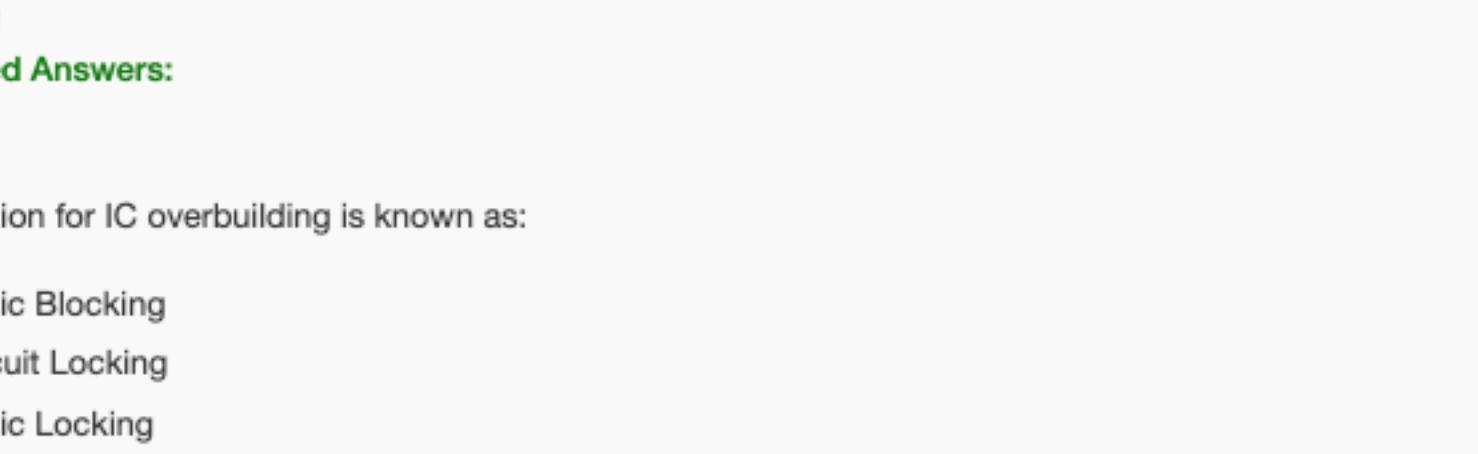
Score: 0

Accepted Answers:

8

5)

1 point



The circuit above is a locked circuit with three primary inputs  $a$ ,  $b$ ,  $c$  and three key inputs  $K1$ ,  $K2$ ,  $K3$ .  $G1$  –  $G5$  are primary gates and  $KG1$  –  $KG3$  are key gates. Which of the following can be a DIP, if key combinations 100 and 110 are considered?

- 001  
 111  
 110  
 101

No, the answer is incorrect.

Score: 0

Accepted Answers:

110

- 6) Consider the statement  $y = x + 5$ . The constant '5' is to be locked and stored using a 4 bits register. What will be the locked constant value if the constant is locked using a 4-bit key  $< 1 \ 1 \ 0 \ 1 >$ ?

1 point

- 5  
 8  
 18  
 13

No, the answer is incorrect.

Score: 0

Accepted Answers:

8

- 7) Genuine IC obtained from the market is known as:

1 point

- Good IC  
 Oracle  
 Correct Chip  
 All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Oracle

- 8) Solution for IC overbuilding is known as:

1 point

- Logic Blocking  
 Circuit Locking  
 Logic Locking  
 All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Logic Locking

- 9) Consider the code snippet:

1 point

```
if (a > b)
{
    z = x + y;
}
else
{
    z = x * y;
}
```

Suppose the condition has to be locked using a single bit key  $k$  whose value is 1. Choose the correct locked version of the code using the key  $k$ .

- if ((a > b) AND k) z = x \* y; else z = x + y;  
 if ((a > b) XOR k) z = x + y; else z = x \* y;  
 if ((a > b) XNOR k) z = x \* y; else z = x + y;  
 if ((a > b) XOR k) z = x \* y; else z = x + y;

No, the answer is incorrect.

Score: 0

Accepted Answers:

$if ((a > b) \text{ XOR } k) z = x * y; \text{ else } z = x + y;$

- 10) A hardware circuit is locked using total  $k$  key bits. If the possible key combinations are 256, then what is the value of  $k$ ?

1 point

- 9  
 8  
 7  
 6

No, the answer is incorrect.

Score: 0

Accepted Answers:

8