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ent Work!

are a highly motivated student, who takes full responsibility for your learning. A reflective learner, who recognises s for development and is committed to personal improvement. An organised learner who always completes class k and homework to a very high standard.

Question **1**

Correct

Mark 2.00 out of 2.00

How many transistors would be needed to implement the following Boolean expression:
A'B + (B + C)'

- a. 8
- b. 9 ✔
- c. 6
- d. 10

Your answer is correct.

The correct answer is:
9

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:05	Saved: 9	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

Question **2**

Correct

Mark 1.00 out of 1.00

In DeMorgan's Law (A+B)' = A' . B'

(A' = NOT A , B' = NOT B)

Accordingly, which of the statement is another example to **DeMorgan's law**?

- a. A . A' = 0
- b. A . B = B . A
- c. (AB)' = A' + B' ✔
- d.
  A + A' = A
  A + A' = A

Your answer is correct.

The correct answer is:
(AB)' = A' + B'

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:06	Saved: (AB)' = A' + B'	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**1.00**

Question **3**

Correct

Mark 1.00 out of 1.00

Simplification of the Boolean expression (A + B)'(C + D + E)' + (A + B)' :

a. C + D + E

b. A'B' ✔

c. C'D'E'

d. A'B'C'D'E'

e. A + B

Your answer is correct.

The correct answer is:
A'B'

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:09	Saved: A'B'	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**1.00**

Question **4**

Correct

Mark 1.00 out of 1.00

Select answers that are true

ABC=

- [x] (A+A').(ABC) ✔
- [x] A'A+(ABC) ✔
- [x] B(AC) ✔
- [ ] B+(AC)

Your answer is correct.

The correct answers are:
B(AC),

A'A+(ABC),

(A+A').(ABC)

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:09	Saved: (A+A').(ABC) ; A'A+(ABC) ; B(AC)	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**1.00**

Question **5**

Correct

Mark 1.00 out of 1.00

An equivalent representation for the Boolean expression A' + 1 is:

1=TRUE 0=FALSE

- a. A
- b. 1 ✔
- c. 0
- d. A'

Your answer is correct.

The correct answer is:
1

Response history

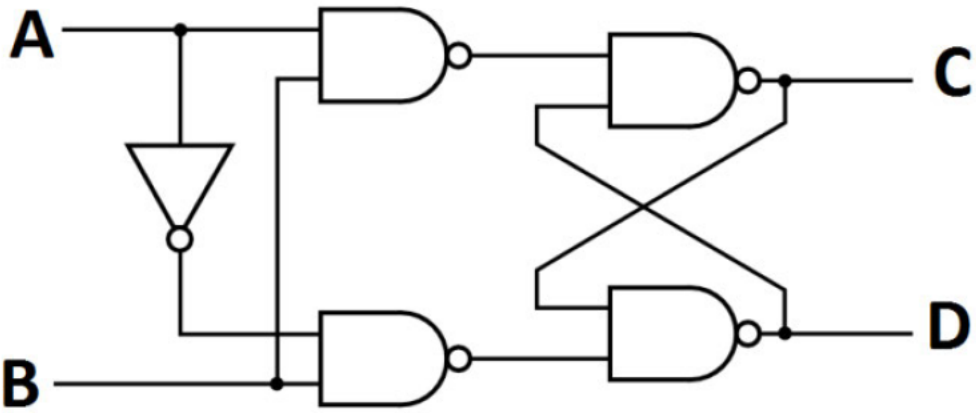
Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:10	Saved: 1	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**1.00**

Question **6**

Correct

Mark 2.00 out of 2.00

Consider the following sequential circuit in order to answer the two following questions.



What is the output of the above flip-flop if A = 0 and B = 1?

a. C = 0 and D = 1 ✔

b. Pending values, not possible to calculate.

c. C = 1 and D = 0

d. C = 0 and D = 0

e. C = 1 and D = 1

Your answer is correct.

The correct answer is:
C = 0 and D = 1

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:16	Saved: C = 0 and D = 1	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

Question **7**

Correct

Mark 2.00 out of 2.00

Now suppose the input is changed to A = 0 and B = 0. Preserving the current state of the flip-flop after the previous input. What is the output of the above flip-flop using the changed input?

a. Pending values, not possible to calculate.

b. C = 0 and D = 1 ✔

c. C = 1 and D = 0

d. C = 0 and D = 0

e. C = 1 and D = 1

Your answer is correct.

The correct answer is:
C = 0 and D = 1

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:19	Saved: C = 0 and D = 1	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

Question **8**

Correct

Mark 2.00 out of 2.00

Given a full subtractor with inputs X and Y , what is X "minus" Y, given that X = 1 , Y = 0 and Y_{out} = 1 ?

a. 0 ✔

b. 2

c. 1

Your answer is correct.

The correct answer is:
0

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:21	Saved: 0	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

Question **9**

Correct

Mark 2.00 out of 2.00

How many transistors are needed to implement the following expression?

$A'B + A(B' + A')$

- a. 11
- b. 15 ✔
- c. 10
- d. 5
- e. 12

Your answer is correct.

The correct answer is:
15

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:28	Saved: 15	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

Question **10**

Correct

Mark 1.00 out of 1.00

A=1

B=0

C=0

(A.B.C+A.(B'+C'))'=

Answer: 0 ✔

The correct answer is: 0

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:30	Saved: 0	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**1.00**

Question **11**

Correct

Mark 1.00 out of 1.00

A=0

B=1

C=1

(A.B.C+A.(B'+C'))'=

Answer: 1 ✔

The correct answer is: 1

Response history

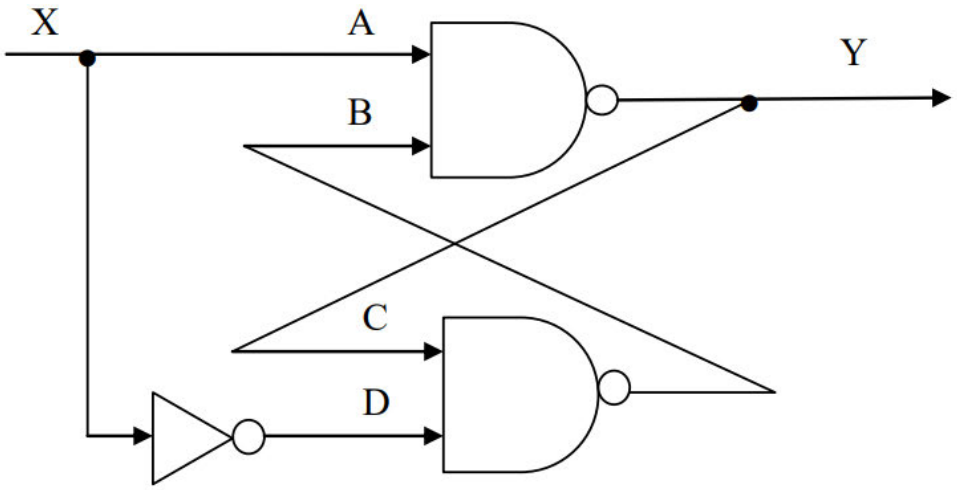
Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:30	Saved: 1	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**1.00**

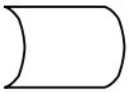
Question **12**

Correct

Mark 2.00 out of 2.00

Consider the flip-flop type circuit shown below. Suppose the input X is a 0. What values will A, B, C, D have? What will be the output Y?



 represents an AND gate.  represents an OR gate.

Answer must be in the format: "answer_A, answer_B, answer_C, answer_D and answer_Y"

(NB: include "and" when answering this question)

Answer: 0, 0, 1, 1, and 1 ✖

The correct answer is: 0,0,1,1 and 1

Comment:

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	

Step	Time	Action	State	Marks
2	17/05/22, 20:34	Saved: 0, 0, 1, 1, and 1	Answer saved	
3	17/05/22, 22:08	Attempt finished	Incorrect	0.00
4	**25/05/22, 16:23**	**Manually graded 2 with comment: Aaqib Khan**	**Correct**	**2.00**

Question **13**

Correct

Mark 1.00 out of 1.00

In order for an S-R Latch to work effectively (i.e., not go into a forbidden state), the outputs must always be complements.

Select one:

- True ✔
- False

The correct answer is 'True'.

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 21:32	Saved: True	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**1.00**

Question **14**

Complete

Not graded

There was an error with this question so it will no longer count for marks.

Select one:

- True
- False

The correct answer is 'True'.

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:34	Saved: True	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Complete**	**0.00**

Question **15**

Correct

Mark 2.00 out of 2.00

What is the difference between the full adders 'sum' and the full subtractors 'difference' in terms of how they are processed in our circuit:

a. The 'sum' can be derived as being not the 'difference'.

b. The 'difference' uses an additional not gate.

c. They both don't use XOR gates.

d. There is no difference. ✔

Your answer is correct.

The correct answer is:
There is no difference.

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:40	Saved: There is no difference.	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

Question **16**

Correct

Mark 2.00 out of 2.00

We currently have a number of joint full adders that let us add 3 digit binary numbers. How many more transistors would we be required to add to our circuit in order to transform it into a full subtractor?

Answer: 6 ✔

The correct answer is: 6

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 21:47	Saved: 6	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

Question **17**

Correct

Mark 2.00 out of 2.00

We have constructed a half subtractor, when working in base 10, if borrowing is necessary, how many units will be required to be borrowed?

- a. 10 ✔
- b. 2
- c. 1
- d. Can't know beforehand.

Your answer is correct.

The correct answer is:
10

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:41	Saved: 10	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

Question **18**

Correct

Mark 3.00 out of 3.00

Complete the following full subtractor truth table.

Inputs			Outputs	
A	**B**	**Borrow$_{in}$**	**Diff**	**Borrow**
0	0	0	0	0
0	0	1	1	1
0	**a**	0	1	1
0	1	1	0	**c**
1	0	0	1	0
1	0	1	**b**	0
1	1	0	0	0
1	1	1	1	1

a. a = 1, b = 0, c = 1 ✔

b. a = 1, b = 1, c = 1

c. a = 0, b = 1, c = 0

d. a = 1, b = 0, c = 0

Your answer is correct.

The correct answer is:
a = 1, b = 0, c = 1

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:50	Saved: a = 1, b = 0, c = 1	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**3.00**

Question **19**

Correct

Mark 2.00 out of 2.00

Considering the full subtractor discussed in class (A-B, with B_in and B_out) we can say that B_in will only be 1 if A ≤ B+B_out.

Select one:

- True
- False ✔

The correct answer is 'False'.

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:53	Saved: False	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

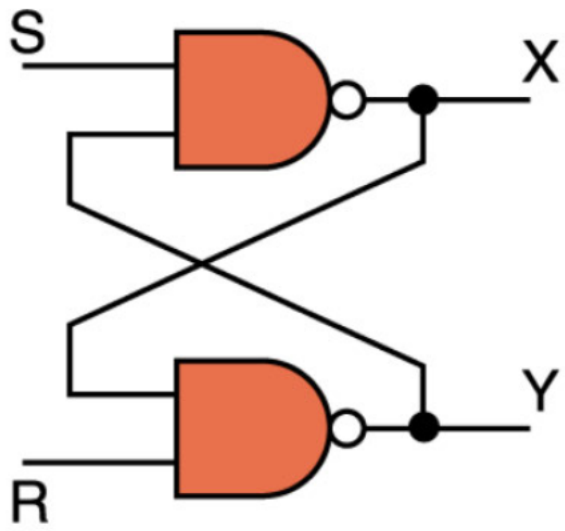
Question **20**

Correct

Mark 2.00 out of 2.00

Given the Diagram below determine the values of X and Y given :

S = 0, R = 1



Select one:

- a. X=1, Y=0. ✔
- b. The circuit oscillates between 0s and 1s.
- c. X=0, Y=0.
- d. X=0, Y=1.
- e. X=1, Y=1.

The correct answer is: X=1, Y=0.

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:54	Saved: X=1, Y=0.	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

Question **21**

Correct

Mark 1.00 out of 1.00

Which is the correct logic gate used to implement an S-R latch?

a. 2 NOR gates.

b. 2 NAND gates.

c. Any of the above. ✔

Your answer is correct.

The correct answer is:
Any of the above.

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 20:55	Saved: Any of the above.	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**1.00**

Question **22**

Correct

Mark 2.00 out of 2.00

We have a SR latch (constructed using NAND gates) that is in a forbidden state, this tells us that:

a. S=1 and R=0

b. S=1 and R=1

c. S=0 and R=1

d. S=0 and R=0 ✔

Your answer is correct.

The correct answer is:
S=0 and R=0

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 21:01	Saved: S=0 and R=0	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

Question **23**

Complete

Not graded

1. When both inputs to an S-R latch constructed with 2 NOR gates is 1 we call it the forbidden state. Why is this state not used? (This is a select all that are correct type question)

a. The output of the latch become unpredictable.

b. The latch flips the 2 inputs, creating an unreliable way of storing bits.

c. The latch does not flip the 2 inputs, creating an unreliable way of storing bits.

d. The first property of the latch is violated as both outputs are 0.

i. a) and d).

ii. a), c) and d).

iii. b) and d).

iv. None of the above.

Your answer is incorrect.

The correct answer is:
a) and d).

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 21:08	Saved: a) and d).	Answer saved	
3	17/05/22, 21:27	Saved: None of the above.	Answer saved	
4	**17/05/22, 22:08**	**Attempt finished**	**Complete**	**0.00**

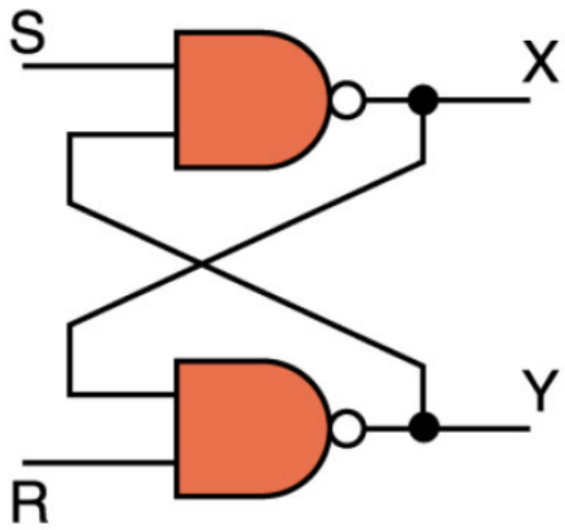
Question **24**

Correct

Mark 1.00 out of 1.00

Given the Diagram below determine the values of X and Y given :

S = 1, R = 0



Select one:

a. X = 0, Y = 0

b. X = 1, Y = 0

c. X = 1, Y = 1

d. X = 0, Y = 1 ✔

e. The circuit oscillates between 0s and 1s.

The correct answer is: X = 0, Y = 1

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 21:09	Saved: X = 0, Y = 1	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**1.00**

Question **25**

Correct

Mark 2.00 out of 2.00

How many bits can a S-R latch store?

a. 1 ✔

b. 2

c. 8

d. None of the above.

Your answer is correct.

The correct answer is:
1

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 21:10	Saved: 1	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

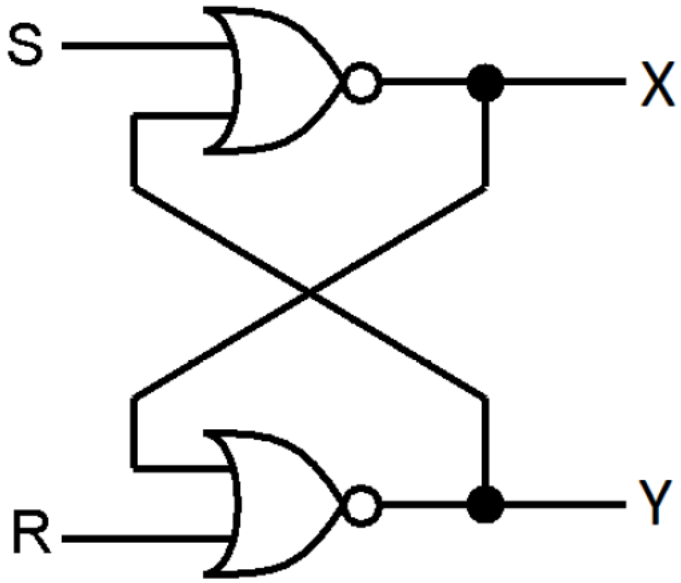
Question **26**

Correct

Mark 2.00 out of 2.00

Given the Diagram below determine the values of X and Y given :

S = 1, R = 0



Select one:

a. The circuit oscillates between 0s and 1s.

b. X=0, Y=0.

c. X=1, Y=1.

d. X=1, Y=0.

e. X=0, Y=1. ✔

The correct answer is: X=0, Y=1.

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 21:16	Saved: X=0, Y=1.	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

Question **27**

Complete

Not graded

We have a S-R latch storing the value 0, if R is momentarily changed to 0 what happens to our stored value in the circuit?

a. It becomes 1.

b. It fluctuates infinitely between 1 and 0.

c. It remains 0.

d. None of the above.

Your answer is incorrect.

The correct answer is:
It becomes 1.

Response history

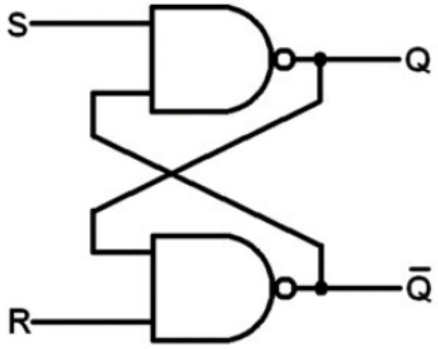
Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 21:18	Saved: It remains 0.	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Complete**	**0.00**

Question **28**

Correct

Mark 2.00 out of 2.00

Consider the latch below;



Which values of R and S will preserve the output of the previous state of the latch?

a. R=1, S=0

b. R=0, S=0

c. R=1, S=1 ✔

d. None of the above.

Your answer is correct.

The correct answer is:

R=1, S=1

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 21:21	Saved: R=1, S=1	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

Question **29**

Correct

Mark 2.00 out of 2.00

We have a memory device that uses 2000 SR latches to store data on, how many bytes of memory can the device store?

Answer: 250 ✔

The correct answer is: 250

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 21:21	Saved: 250	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

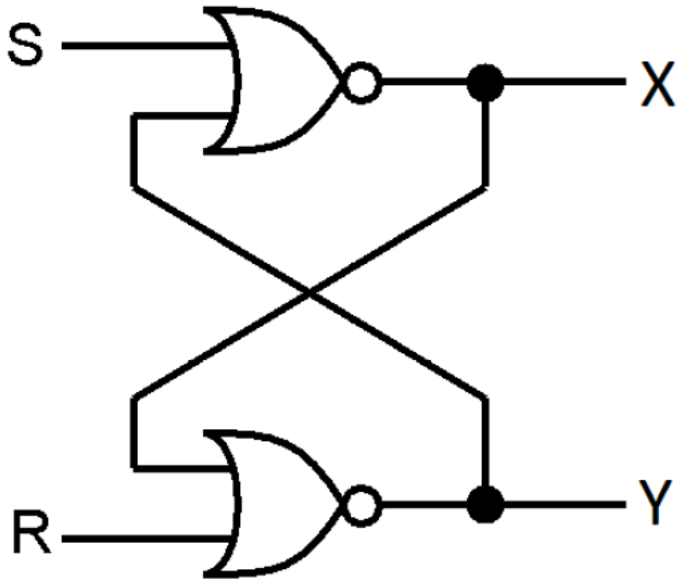
Question **30**

Correct

Mark 2.00 out of 2.00

Given the Diagram below determine the values of X and Y given :

S = 1, R = 1



Select one:

a. X=1, Y=0

b. The circuit oscillates between 0s and 1s.

c. X=1, Y=1

d. X=0, Y=1

e. X=0, Y=0. ✔

The correct answer is: X=0, Y=0.

Response history

Step	Time	Action	State	Marks
1	17/05/22, 20:03	Started	Not yet answered	
2	17/05/22, 21:23	Saved: X=0, Y=0.	Answer saved	
3	**17/05/22, 22:08**	**Attempt finished**	**Correct**	**2.00**

◄ Lesson 3- Gates and Circuits by Dr. Ritesh Ajoodha

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