Student Name: Solutions

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BLG231E Digital Circuits
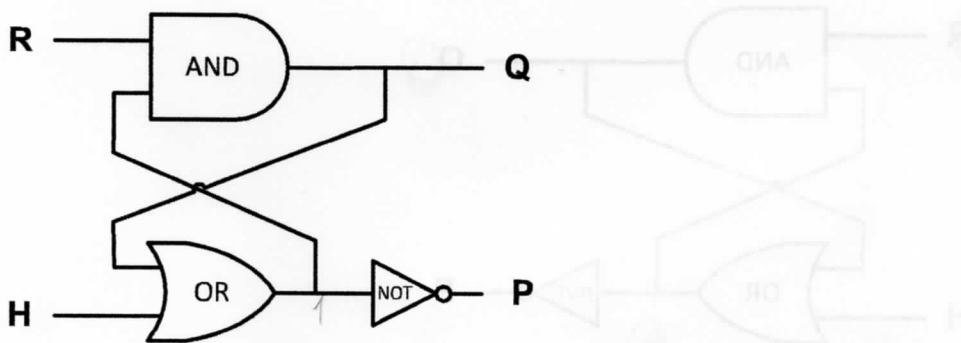## Quiz 2

Duration: 20 Minutes
Grading: 1a) 50%, 1b) 50%,
Quiz is in closed-notes and closed-books format
For your answers please use the space provided in the exam sheet
GOOD LUCK!

1. Consider a sequential circuit shown below.

a) An expected operation of the circuit is having complemented logic values for **Q** and **P** outputs. Determine the restrictions on **R** and **H** so that P equals to Q. Fill in the truth table below with indicating the **bad conditions** or restricted cases

R	H	Q-pre	Q	P
0	0	0	0	1
0	0	1	0	1
0	1	0	0	0
0	1	1	0	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	0

{ same ⇒ restricted

b) Suppose that the inverter has a delay of **1ns;** the AND gates has a delay of **2ns;** and the OR gate has a delay of **5ns** . Sketch the **waveforms at the outputs Q and P** if the input signals R and H shown below are applied. Suppose that initial values of Q and P are logic 0 and 1, respectively.

R

1

0

H

1

0

|←————45ns————→|

|←—15ns—→|←—15ns—→|←—15ns—→|

OR-OUT

1
0

5ns

Q

1
0

2ns

P

1
0

1ns