

Midterm Exam S2

Computer Architecture

Duration: 1 hr 30 min

Answer on the answer sheet only.

Do not show any calculation unless you are explicitly asked.

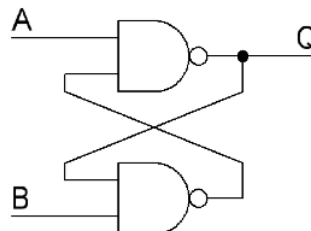
Do not use a pencil or red ink.

Exercise 1 (9 points)

1. Convert the numbers given on the [answer sheet](#) into their **single-precision** IEEE-754 representations. Write down the final result in its **binary form** and specify the three fields.
2. Convert the **double-precision** IEEE-754 words given on the [answer sheet](#) into their associated representations. If a representation is a number, use the base-10 following form: $k \times 2^n$ where k and n are integers (either positive or negative).
3. Determine the smallest and largest absolute values of a double-precision IEEE-754 **denormalized** number. Use the following form: 2^n for the smallest number and $(1 - 2^{n1}) \times 2^{n2}$ for the largest number where n , $n1$ and $n2$ are integers (either positive or negative). Write down the base-10 numerical values of n , $n1$ and $n2$ on the [answer sheet](#).

Exercise 2 (3 points)

Let us consider the following circuit:



1. Complete the truth table shown on the [answer sheet](#).
2. What is the name of this circuit?

Exercise 3 (1 point)

Draw the circuit diagram of a divide-by-two circuit by using only one master-slave RS flip-flop. Answer on the [answer sheet](#).

Exercise 4 (7 points)

Complete the timing diagrams shown on the [answer sheet](#) (up to the last vertical dotted line) for the following circuits.

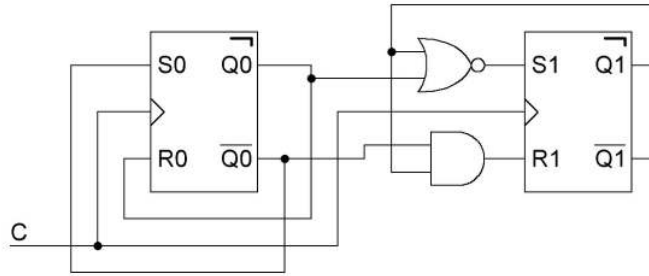


Figure 1

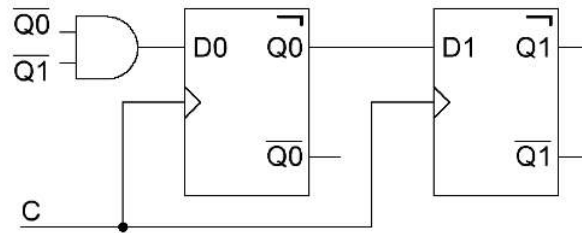


Figure 2

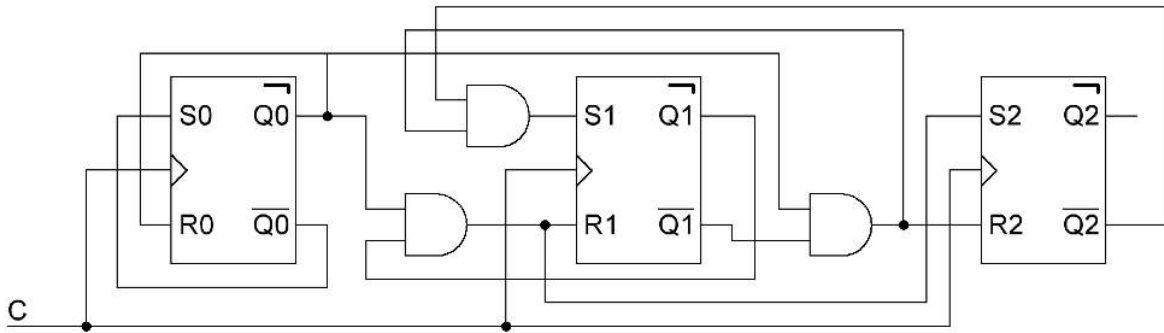


Figure 3

Last name: First name: Group:

ANSWER SHEET

Exercise 1

1.

Number	S	E	M
257			
78.1875			
0.109375			

2.

IEEE-754 Representation	Associated Representation
2A48 0000 0000 0000 ₁₆	
FFF0 0000 0000 000F ₁₆	
000B C000 0000 0000 ₁₆	
4000 0000 0000 0000 ₁₆	

3.

n	n1	n2

Exercise 2

A	B	Q
0	0	
0	1	
1	0	
1	1	

Name of the circuit

Exercise 3

Divide-by-Two Circuit

Exercise 4

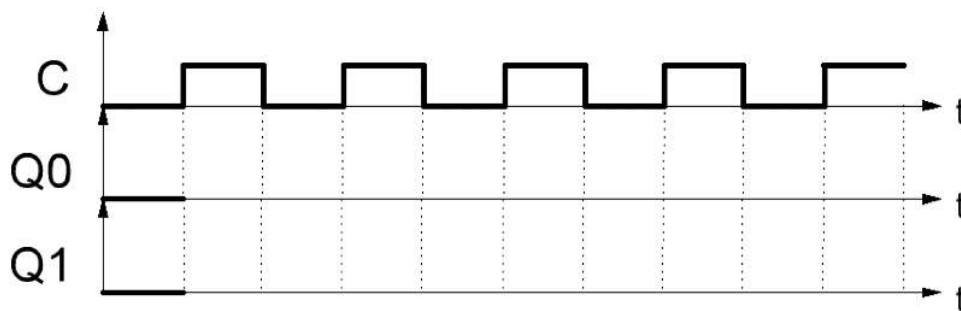


Figure 1

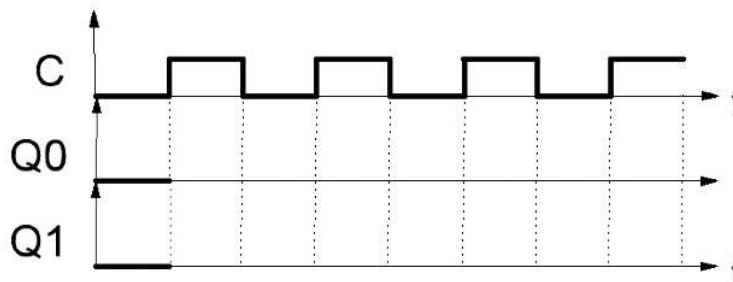


Figure 2

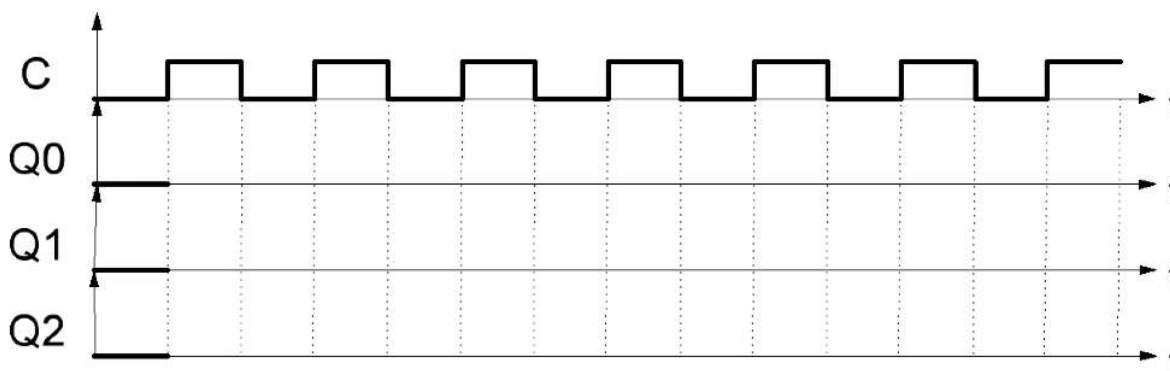


Figure 3

Feel free to use the blank space below if you need to: