PROBLEM 1: GENERAL QUESTIONS

Answer the following questions in a concise way. You are encouraged to look for the answer online. These questions will not be graded for the homework and you are not required to provide a report for them or submit anything, but they might be part of the final exam.

1) What data type would you use for memory cells in a CPU?
2) What are the differences between an ASIC and a FPGA?
3) Identify the problem with the code snippet below and rewrite it to fix the problem.

```
always @(posedge clk)
x = 2;
always @(posedge clk)
y = x;
```

4) Implement a latch using 2:1 Mux and write verilog code for the same.
5) The addition and subtraction in a CPU can be done using the same circuit? Yes/No. Explain with reason
6) Would this code simulate? Explain your reasons and any potential problem this would lead to when implemented in hardware?

```
always @* begin
    case (sel)
        2'b00: y = a;
        2'b01: y = b;
        2'b01: y = c;
        2'b11: y = d;
    endcase
end
```

7) What is the period and frequency of the given clock generator?

```
always begin
    #5 clk = ~clk
end
```

8) What is the difference between a normal register and a shift register?
9) What is ALU? What is the function of it?
10) What is the size of a transistor in a modern CPU? What are the limitations in making transistors smaller?
PROBLEM 2: TINY CPU PROJECT
Implement the Tiny CPU project by following the description in the document presented in class. The document can be accessed at the following link:

https://cseweb.ucsd.edu/classes/su16_2/cse140L-a/homeworks/CSE140L_Lab4.pdf

Checkoff list (to be completed with a tutor, a TA or the instructor before the end of last available office hour on Wednesday 08/24, which starts at 3:30PM).
NOTE: before starting the checkoff, a student MUST submit its zipped project via TED. The submitted material MUST contain the source code.
The checkoff can only be attempted once, so make sure that your solution is working fine.
You can have your projects compiled in advance.
   1) Submit the zipped project folder containing ALL of your source code on TED
   2) Explain the functionality of the Tiny CPU
   3) Review the Verilog code
   4) Run testbench and explain the results to verify the functionality