

CENG311 Computer Architecture
Fall 2013 – Midterm

Duration: 1.5 Hours

Q1 (20pts) Please shortly explain the difference between structural and behavioural coding in VHDL. You can give small examples to better explain if you wish.

Q2 (20pts) The below code is an excerpt from a VHDL program. Assume that at some time, signal *a* changes from "00000001" to "00000000". What would be the final value of signal *x*?

```
(1)    signal a: std_logic_vector(7 downto 0);  
(2)    signal x: std_logic;  
      ...  
(3)    process(a)  
(4)      variable b: integer :=1;  
(5)    begin  
(6)      a<="01010101";  
(7)      b:=2;  
(8)      x<=a(b);
```

Q3 (20pts) Write down the VHDL program of D Flip-Flop.

Q4 (20pts) We want to connect two 8255 PIO ICs and one 64-bytes RAM to μ Pabs-2. Please design an address decoder circuit using partial address decoding technique, which produces the necessary chip select signals to 8255s and RAM. Do not draw the complete circuit, please just draw the address decoder circuit.

Q5 (20pts) Assembly commands **mov A, A** and **nop** (no-operation) are semantically identical. Which one do you prefer to implement idle time and why?

Your answers: