Final Exam

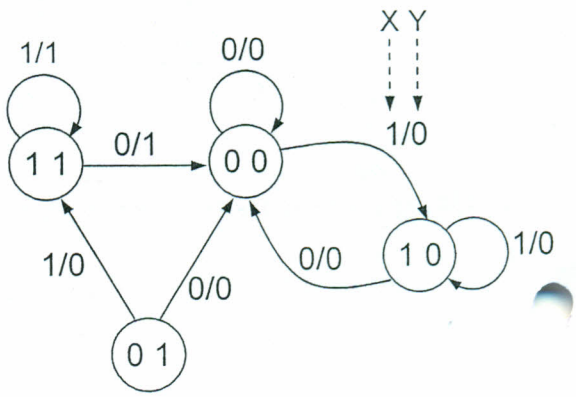
Computer Engineering

Computer and Syst. Dept.
Time Allowed: 3 hrs.
4th Year Students.
Dr: Ahmed Saleh
Total Marks: 100
2012 – 2013

- يسمح باستخدام القلم الرصاص (شرط وضوح الخط).
- الرجاء وضوح الرسم قدر المستطاع (ليس شرطا استخدام المسطرة)
- الامتحان في ورقتين.

Attempt the following questions:

(1) Design the sequential circuit for the state diagram shown in the figure, use D flip flops.



(2) Draw (**ONLY**) the following circuits:

- A block diagram for the processor unit.
- 5 bit shift left register.
- 3 bit register with load control.
- Serial Adder circuit.
- 2-bit parallel adder.
- A ripple counter that counts from 15 to 0 at –ve edge.
- 4-bit synchronous counter.

(3) Define the following terms:

- N-bit register.
- N-bit counter.
- Flip flop.

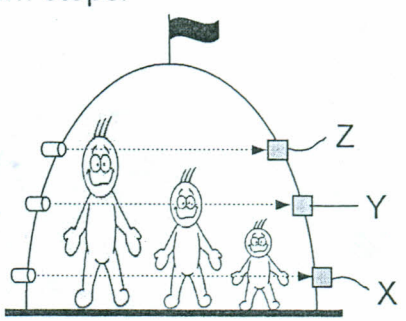
(3 marks)

(4) Design a counter with the following sequence **0, 1, 3, 7, 6, 4** (**Using J-K flip flop**).

(5) Design digital system with 3 registers A, B, C and a flip flop E (of J-K type) to perform the following:

- When a start signal S=1, Transfer two numbers to A and B.
- If A>B: Clear register A and set flip flop E to 1, then increment B in the next clock pulse. Then system stops.
- If A≤B: Clear flip flop E, then,
  - If A<B: shift left A, then add the contents of A (after shift) to B and transfer results to C. Then system stops.
  - If A=B: increment B in the next clock pulse, then system stops.

(6) Design digital system to categorize (يصنف) the people that enter from the door shown in figure according to their tall (طول الشخص) into 3 categories. Use 3 counters R1, R2, and R3.



Turn the page →

(7) Design an ALU to perform the following functions:

S_2	S_1	S_0	$C_{in}=0$	$C_{in}=1$
0	0	0	F=A	F=A+1
0	0	1	F=A-B-1	F=A-B
0	1	0	F=A+B	F=A+B+1
0	1	1	F=A-1	F=A
1	0	0	$A \vee B$ (OR)	
1	0	1	$A \odot B$ (XNOR)	
1	1	0	$(A \wedge B)'$ (NAND)	
1	1	1	A' (NOT)	

(8 marks)

(8) Design a universal shift register to perform the following functions:

S_1	S_0	Function
0	0	Shift left
0	1	Load external input
1	0	Clear
1	1	No change

---------- End Of Questions ----------

With Best Wishes
Dr: Ahmed Saleh

PLZ, send your opinion about the exam to:
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