EASTERN MEDITERRANEAN UNIVERSITY
COMPUTER ENGINEERING DEPARTMENT
CMPE 224 COMPUTER ARCHITECTURE I
HW#1

Q.1. Show how an SR-FF can be constructed using a D FF and other logic gates.

Q.2. One way to avoid the undesired behavior of SR-FFs, when S=R=1, is to create a set-dominant SR-FF in which the condition S=R=1 cause the FF to be set to 1. Design a set-dominant SR-FF and show its circuit.

Q.3. Show how a JK-FF can be constructed using a T-FF and other logic gates.

Q.4. Design a 3-bit up/down counter using T-FFs. It should include a control input w. If w=0, the circuit should behave as an up-counter. If w=1, then the circuit should behave as a down counter.

Q.5. Design a clocked sequential circuit with single input w and single output z. the circuit generates z=1 when the last and the previous two bits on w form subsequences 010 or 110; otherwise z=0. Overlapping input patterns are allowed.

Q.6. Design a clocked sequential circuit that produces an output z=1 if it detect the presence of subsequences 001 or 011 in the input sequence along a single input line x.

Q.7. A clocked sequential circuit has two inputs w1 and w2, and an output z. Its function is to compare the input sequences on w1 and w2. If w1=w2 during any four clock cycles, the circuit produces z=1; otherwise z=0. For example,

     w1: 0110111000110
     w2: 1110101000111
     z : 0000100001110

Q.8. Design a moulo-6 counter which counts in the sequence 0,1,2,3,4,5,0,1,…. The counter counts the clock pulses its enable input w is equal to 1, otherwise it keeps the latest count until it is enabled again. Use D-FFs in your design.

Q.9. Repeat Q.8 using JK-FFs.

Q.10. Repeat Q.8 using T-FFs.

Q.11. Design a 3-bit counter-like circuit controlled by an input w. If w=1, then the counter adds 2 to its contents, wrapping around 8 or 9. Thus, if the present state is 8 or 9, then the next state becomes 0 or 1, respectively. If w=0, then the counter subtracts 1 from its contents, acting as a normal down counter. Use RS-FFs in your design.

Q.12. Repeat Q.11 using JK-FFs.

Q.13. Repeat Q.11 using D-FFs.

Q.14. Repeat Q.11 using T-FFs.