1. Design a 4-input priority encoder with input D0 (the Lowest Significant Bit) having the highest priority and input D3 (the Highest Significant Bit) having the lowest priority. Assume that x, y are outputs, and y is the Lowest Significant Bit (20pt)

2. Design the negative edge triggered synchronous 3-bit binary counter using T flip-flops. (20pt)

3. Design a negative edge triggered synchronous sequential circuit with two D flip-flops A and B, and one input x. When x=0, the state of the circuit remains the same. When x=1, the circuit goes through the state transitions from 00 to 01 to 11 to 10 back to 00, and repeated. (20pt)

4. Obtain the input Boolean functions for a synchronous BCD counter with J-K flip-flops. (20pt)

5. Obtain the input Boolean functions for a synchronous counter with the following repeated binary sequence: 0, 1, 2, 4, 6. Use D flip-flops. And obtain the next number when it start at 3, 5 or 7 (20pt)