

## Sample Openended Experiments

### Combinational Circuits

1. Design combinational circuit that generates 9's complement of BCD.
2. Design 4-bit Binary Adder-Subtractor circuit.
3. Design a 4-bit Binary Comparator.
4. Design XS-3 to BCD decoder
5. Design BCD to XS-3 decoder.
6. Design a code converter that converts a decimal in 84-2-1 to BCD.
7. Design a 4-bit binary multiplier.
8. Design a 4-input priority encoder with priority  $D_3 > D_0 > D_2 > D_1$ .
9. Implement 4-bit even and odd parity generator using one 4X1 Mux and XOR gates.
10. Design a BCD adder.
11. Design a 7-bit Hamming code generator and Decoder.
12. Design Full adder using two 1X8 demultiplexer and required gates.
13. Design Full subtractor using two 1X8 demultiplexer and required gates.
14. Design combinational circuit that generates 10's complement of a BCD digit.
15. Design a combinational circuit whose 4-bit output is formed by shifting 4-bit input to 2 positions to the right and filling the vacant positions with the MSB bit before the Shift.
16. Design a combinational circuit whose 4-bit output is formed by shifting 4-bit input to 2 positions to the left and filling the vacant positions with the 0s.

### Sequential Circuits

1. Design a BCD synchronous counter.
2. Design a counter with T flip-flops that goes through the following binary repeated sequence 0,3,1,7,6,4.
3. Design a counter with J-K flip-flops that goes through the following binary repeated sequence 0,1,2,3,4,5,6.
4. Design a counter with D flip-flops that goes through the following binary repeated sequence 0,1,2,4,6.
5. Design a 4-bit bidirectional shift registers.
6. Design a sequence detector using D flip-flops that detects the given sequence "10110" using Mealy model.
7. Design a sequence detector using T flip-flops that detects the given sequence "10001" using Mealy model.
8. Design a sequence detector using D flip-flops that detects the given sequence "10111" using Moore model.
9. Design a sequence detector using T flip-flops that detects the given sequence "10010" using Moore model.
10. Design a sequence detector using D flip-flops that detects the given sequences "101" and "110" using Mealy model.

11. Design a sequence detector using T flip-flops that detects the given sequences "101" and "010" using Moore model.
12. Design a counter with J-K flip-flops that goes through the following binary repeated sequence 0,1,3,5,7.
13. Design a 4-bit Universal shift register that performs for 00 Load, 01 left shift, 10 right shift, 11.
14. Design a 4-bit Universal shift register that performs for 01 left shift, 10 right shift, 11 load