Digital System Design Class Test-01

Lecture-06: Sequential Logic

1. Differentiate between_

- ***Combinational and sequential logic circuits.*****
- **Synchronous and asynchronous circuits.**

2. Define latch and flip-flop.

3. Distinguish between latch and flip-flop.

4. Explain clocked SR flip-flop with logic diagram, truth table and characteristics equation.

5. Compare between D latch and D flip-flop with timing diagram.

6. Define set up and hold up time with necessary diagram.

7. Explain D flip-flop with asynchronous Preset and Clear input signals with block diagram, truth table and timing diagram.

8. Design a clocked master-slave JK flip-flop.

9. Show the implementation of T flip-flop and D flip-flop.

10. Define excitation table. Write the excitation table of SR, T, JK and D flip-flop.**

11. What do you mean by negative edge triggered flip-flop, positive-edge triggered flip-flop and level triggered flip-flop. Explain with diagrams.

Lecture-07: Register and Counters

1. What is a shift register?

2. Mention the different modes of operations of the shift register.

3. Draw the block diagram of 4-bit serial input serial output shift register, discuss its operations and draw the truth table and waveforms.

4. Draw the circuit diagram of a 4 bit serial in parallel out and parallel in serial out shift registers.

5. Design a 4 bit right shift register with parallel load of data.

6. Design a 4 bit bidirectional shift register with parallel load.

7. Show the circuit and timing diagram of a 4 bit bidirectional shift register.

8. Discuss the difference between serial and parallel modes of operation in a register.

Lecture-08: Counters

1. What is counter? List the applications of counter.

2. Classify counters in shift registers.

3. Define synchronous counter and asynchronous counter.**

4. Write the advantages and disadvantages of synchronous counter and asynchronous counter? *****

5. What is ripple counter? Draw the logic diagram of a BCD ripple counter with timing diagram.

6. Draw the truth table and design a logic diagram of a MOD-10 ripple counter. Explain its operation with timing diagram.

7. Construct a decade counter and explain its operation.

8. Design a synchronous counter for counting following 4 bit binary sequence using T flip-flop or JK flip-flop. $1001 \rightarrow 0110 \rightarrow 1110 \rightarrow 0111 \rightarrow 0011 \rightarrow 1100 \rightarrow 1010 \rightarrow 0101 \rightarrow 1001$ ***.*****

9. Design a 4 bit synchronous counter for counting the following binary sequence:
$0000 \rightarrow 0101 \rightarrow 1010 \rightarrow 0110 \rightarrow 1001 \rightarrow 0011 \rightarrow 1100 \rightarrow 1111 \rightarrow 0000$

10. Design a 4 bit synchronous counter for counting the following binary sequence:
$0000 \rightarrow 0010 \rightarrow 0011 \rightarrow 0110 \rightarrow 0101 \rightarrow 0001 \rightarrow 0000$

11. Design a counter with JK flip-flop that will count the sequence 0, 1, 3, 7, 5, 2, 0 and 0, 1, 5, 4, 3, 2, 0.

12. Design a clocked sequential circuit that counts from $00 \rightarrow 01 \rightarrow 10 \rightarrow 11$ ***.***

13. Explain the operation of Johnson or Ring counter in brief and explain its operation***

15. How does the binary counter work as a frequency divider?

16. What is the frequency of the output of the 8^{th} flip-flop when the input clock frequency is 512 Khz?

17. Draw a counter circuit that will convert a 64-Khz pulse signal into a 1-Khz or 8-Khz square wave.**

18. Design a MOD-8 synchronous up/down counter and explain its operation with timing diagram.**

19. What is presettable counters and define state table and state diagram.