

IT302: Digital Logic and Circuit Design

Answer any SEVEN.

FM – 70

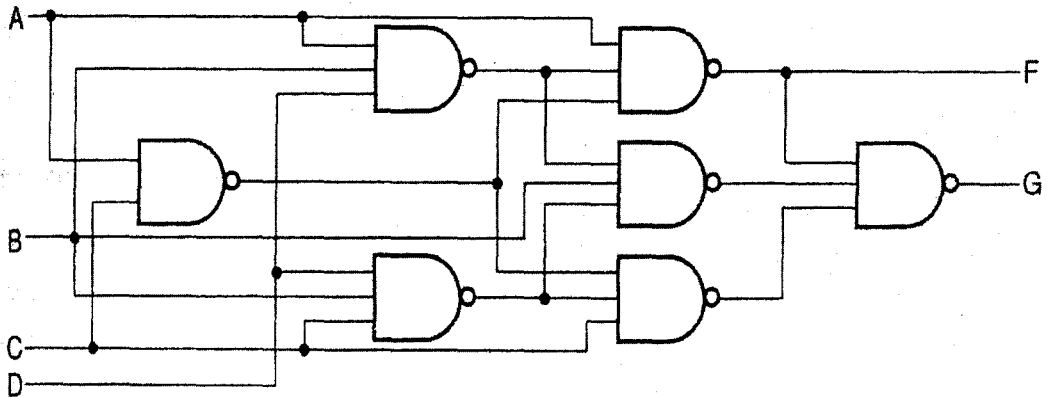
Duration: 3 hr

1. What are the primary differences between a combinational and sequential digital system? Explain with a block diagram. Justify whether the following systems are combinational or sequential with reason.
 - a. Output of the system depends only on the past values of the outputs and not the inputs, present or past.
 - b. Output of the system depends only on the past values of the inputs and not the present inputs or past outputs.
 - c. Output of the system depends on present as well as past values of the inputs and past values of the outputs.
 - d. Output of the system depends only on the present values of the inputs and not any past values.

4+6

2.
 - a. Find the simplified Boolean functions for outputs F and G of the circuit in the following figure.
 - b. Find the truth table for F and G of the circuit in figure by using logic simulation.

5+5



3.
 - a. What is race around condition with reference to JK flip flop? Clearly explain.
 - b. How is the problem overcome?
 - c. How can you use an SR flip flop as a toggle switch?

3+4+3

4.
 - a. Design an excess-3-to-BCD-code converter using minimum number of NAND gates.
 - b. Design a parity generator to generate an odd parity bit for a 4-bit word. Use XOR and XNOR gates.

5. Realize the following function of four variables using

- a. 8:1 multiplexers
- b. 16:1 multiplexers, and
- c. 4-to-16 line decoder with active low outputs.
 - i. $F = \Sigma m(0, 3, 5, 6, 9, 10, 12, 15)$

4+3+3

6.

- a. What are the primary differences between a flip flop and a latch?
- b. Discuss the advantages of edge triggering compared to level triggering?
- c. How can you use a JK flip flop as a D type one?
- d. What are the advantages and disadvantages of divide by N counter compared to Johnson counter? Explain.

2+2+2+4

7.

- a. Design a 4 bit shift register that can operate in all four modes.
- b. Determine the numbers of clock cycles required to transfer a byte in all these four modes.

6+4

8.

- a. What are the differences between synchronous and asynchronous sequential circuits?
- b. Explain the principle of operation of a clocked SR flip flop with preset and clear inputs.
- c. Mention major applications of flip flops.

4+4+2

9.

- a. What is don't care condition?
- b. Why do they appear?
- c. How can you use these during the logic expression simplification? Clearly explain with an example.

2+2+6