Reg. No. : | | | | | | | | | | | | |

Question Paper Code: 1063376

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024

Third Semester

Electronics and Communication Engineering

U20EC303 – DIGITAL INTEGRATED CIRCUITS

(Regulation 2020)

Time: Three Hours | Maximum: 100 Marks

Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. Prove that
(A+B)(A+C)=A+BC.

2. List the different types of digital logic families.

3. Define Half adder and full adder.

4. What is Multiplexer? Give its application.

5. Write the characteristic equation of a SR and D flip flop.

6. Define race around condition.

7. Compare synchronous and asynchronous sequential circuits.

8. Differentiate between static hazard and dynamic hazard.

9. Give the classification of PLDs.

10. Compare RAM and ROM.

PART – B (5 x 16 = 80 Marks)

11. (a) Simplify the Boolean function using Quine-McCluskef = $\sum m(0,1,2,5,6,7,8,9,10,14)$. (16)

(OR)

(b) Organize the different types of logic families with neat diagram and different characteristics. (16)

12. (a) Design a combinational circuit which accepts 4 bit binary code and converts its equivalent gray code. (16)

(OR)

(b) Design a two bit magnitude comparator using logic gates. (16)

13. (a) Design a MOD 10 counter using JK flip-flop. (16)

(OR)

(b) (i) Convert a J K-flip flop to a D flip flop.
(ii) Construct a parallel- out shift register with logic diagram. (8+8)

14. (a) An asynchronous sequential circuit is described by following excitation and output function.

$Y = x_1 x_2 + (x_1 + x_2) y$ (excitation)

Z=y (output)

Draw the logic diagram of the circuit, derive the transition table, flow table and output map. (16)

(OR)

(b) Explain the different race conditions in Asynchronous sequential circuit and also explain the method to overcome the critical racing problem. (16)

15. (a) Implement the following Boolean functions using the PAL device as shown above:
W(A, B, C, D) = Σm(2, 12, 13)
X(A, B, C, D) = Σm(7, 8, 9, 10, 11, 12, 13, 14, 15)
Y(A, B, C, D) = Σm(0, 2, 3, 4, 5, 6, 7, 8, 10, 11, 15)
Z(A, B, C, D) = Σm(1, 2, 8, 12, 13)
(16)

(OR)

(b) Develop a 4 bit microprocessor with 4 bit data and 8 bit address bus. (16)

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