Digital logic fundamentals

Question Bank

Subject Name : Digital Logic Fundamentals

Subject code: CA102T

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Unit I

5 Marks

1. What is Number system?
2. Define binary logic.
3. Show how negative numbers are stored in a digital computer?
4. Convert decimal number $(300.55)_{10}$ to octal and hexadecimal number?
5. State and Prove De Morgan's theorem.
6. Write short notes on Boolean laws and theorem?
7. What are the basic gates? Show along with the truth table.
8. Convert binary number 10010110.1001 to decimal and octal number.
9. Convert a. $(450.12)_8$ to hexadecimal
   b. $(C2AE)_{16}$ to octal
10. What are the Universal gates? Brief any one.
11. Brief binary number system with example?
12. Brief the Huntington postulates of Boolean algebra?
13. State and Prove demorgan's double inversion theorem.

10 Marks

1. Convert decimal $(1345.106)_{10}$ to binary, octal and hexadecimal.
2. Explain the various Boolean laws with logic diagrams.
3. Explain the logic gates in detail?
4. Define the duality principle in Boolean algebra?
5. State and prove the absorption theorem using postulates?
6. Show the theorems of Boolean algebra with correct derivations.
7. Define the term logic gates. Explain the various basic gates with their symbols and truth table.

8. What are the universal gates and explain them?
9. Prove the De Morgan's theorem with logic diagrams.

Unit II

5 Marks

1. Convert to the canonical form $F(x,y,z)=\sum(1,3,7)$
2. Draw K-map for 3-variables.
3. Write a note on Don't care condition with example.
4. Explain the karnaugh map method
5. Simplify the Boolean function $F(A,B,C,D)=\sum(0,1,2,5,8,9,10)$ as
   i. Sum of products
   ii. Product of sums
6. Simplify the following expression using Quine McClausky method and verify using K-map
   $F(A,B,C,D)=\sum(0,1,2,3,4,6,8,10,12,14)$
7. Simplify the boolean function $F(W,X,Y,Z)=\sum(1,3,7,11,15)$ and the don't care condition $d(w,x,y,z)=\sum(0,2,5)$
8. Convert the following to the other canonical form
   a) $F(X,Y,Z)=\sum(1,3,7)$
   b) $F(A,B,C,D)=\pi(0,1,2,3,4,6,12)$
9. Explain Pos method with example?
10. Simplify the following using K-map $f(x,y,z)=\sum(0,2,4,5,6)$
11. Find the product of maxterms for the given function $F(X,Y,Z)=\sum(0,2,4,5,6)$
12. Differentiate between SOP and POS.
13. Simplify $F(W,X,Y,Z)=\sum(1,3,7,11,15)$ with don't care function $d(w,x,y,z)=\sum(0,2,5)$
14. Find the POS for the function $F(x,y,z)=\pi(0,1,4,5)$
15. Discuss about five variable k-map.

10 Marks

1. Simplify using k-map $F=(W,X,Y,Z)=\sum(2,3,12,13,14,15)$
2. Simplify using Quine McClausky tabulation method

F=∑(0,1,2,810,11,14,15)

3. What is SOP and POS? Explain.
4. Explain the method of Karnaugh map simplification with don't care condition. Give example.
5. Simplify the following expression using Quine McClausky tabulation method and verify using K-Map

   F(A,B,C,D)=∑(0,1,2,3,5,6,7,8,11,13)
6. Explain the steps involved in 4-variable k-map simplification?
7. Simplify using tabulation method F=∑(0,1,2,8,10,11,14,15)
8. Simplify the Boolean function using k-map

   F(W,X,Y,Z)=∑(1,3,4,6,9,11,12,14)
9. Find using K-map F(W,X,Y,Z)=∑(0,1,2,4,5,6,8,9,12,13,14)
10. Find SOP : i) F=A+B'c

    ii)F=xy+x'z
11. Explain about SOP with an example.
12. Explain Quine McClausky tabulation method with example.
13. Write down the steps to convert Boolean functions into sum of minterms and product of max terms with suitable example.

Unit III

5 Marks

1. Discuss briefly the Full adder with the truth table and circuit
2. Explain the BCD adder with block diagram
3. Write note on the full- subtractor with block diagram and truth table
4. Write the working principle of Full- adder with its circuit and truth table.
5. Explain ROM and its types.
6. What is PLA? Draw the block diagram of PLA and explain it?

10 Marks

1. Give the working principle of BCD adder.
2. Write about the working style of half adder and full adder with the help of circuits.
3. Explain the block diagram of full adder.
4. Construct a 4- bit binary adder.
5. List the various types of ROM in detail.
6. Implement the circuit of a PLA with 3 input, 2 output and 4 product terms
   $F_1(A,B,C)=\sum(3,5,6,7)$
   $F_2(A,B,c)=\sum(0,2,4)$
7. Design a circuit using ROM for
   $F_1(A1,A0)=\sum(1,2,3)$
   $F_2(A1,A0)=\sum(0,2)$

Unit IV

5 Marks

1. Explain the working of encoder?
2. What is decoder? Draw 1 of 16 decoder circuit and explain it.
3. Design a BCD to decimal decoder?
4. What is encoder? Give the truth table of octal to binary encoder?
5. Implement the following function with a multiplexer?
   $F(A,B,C,D)=\sum(0,1,3,4,8,9,15)$
6. Explain about the multiplexer with a block diagram.

10 Marks

1. Give a detailed account on encoder.
2. Draw the gate equivalent circuit of 8 x 1 multiplexer. Explain its working?
3. What is demultiplexer? Explain the quadruple 2 to 1 multiplexer with neat logic diagram and function table.

4. Design a combinational circuit using ROM. The circuit accepts a 3-bit number and generates an output binary number equal to square of input number.
5. Explain about encoder and decoder.
6. Types of ROM in detail.
7. How will you implement $F(A,B,C)=\sum(1,3,5,6,7)$ with a multiplexer.
8. Explain in detail about ROM/PLA.
9. Design a 1 of 16 decoder with a neat diagram.

UNIT V

5 Marks

1. What is latch? Explain.
2. What is Flip-Flop? Why we need it?
3. Explain the working of JK flip flop?
4. Write short notes on shift registers.
5. How can you make D flip flop from RS flip flop?
6. Define counter. List out its types.
7. Brief the working principle of D flip flop.
8. How does a 4 bit register work with a parallel load?
9. Draw the circuit of T flip flop and explain briefly.
10. Brief the working of RS flip flop.

10 Marks

1. Explain the JK flip flop with a neat diagram.
2. Explain the shift register in detail.
3. Explain the concept of BCD counter with parallel load?
4. Discuss about the Master slave flip flop
5. Explain the bidirectional shift register with parallel load?
6. Explain in detail about ripple counter.