Tribhuvan University
Institute of Science and Technology
2065
✡

Bachelor Level/ First Year/ Second Semester/ Science — Full Marks: 60
Computer Science and Information Technology (CSc. 151) — Pass Marks: 24
(Digital Logic) — Time: 3 hours.

Candidates are required to give their answers in their own words as for as practicable.
The figures in the margin indicate full marks.

Long Answer Questions:
Attempt any TWO questions: (10x2=20)

1. Draw a block diagram, truth table and logic circuit of a 16 x 1 multiplexer and explain its working principle.

2. Explain the 4 bit ripple counter and also draw a timing diagram.

3. Design the full subtractor circuit with using Decoder and explain the working principle.

Short Answer Questions:
Attempt any EIGHT questions: (8x5=40)

4. Design a half adder logic using only NOR gate.

5. Convert the following decimal numbers into hexadecimal and octal number.
   a) 304 b) 224

6. Describe the three Variable K-map with example.

7. Design the Decoder using Universal gates.

8. What is combinational logic? What are its important features.

9. Describe the clocked RS flip-flop.

10. What do you mean by triggering of flip flop?

11. What are the shift Register operations?

12. Describe the Ripple counter.

13. Write short notes on:
    a) Registers.
    b) Digital.
    c) EBCDIC.

Tribhuvan University
Institute of Science and Technology
2066
✡

Bachelor Level/ First Year/ Second Semester/ Science — Full Marks: 60
Computer Science and Information Technology (CSc. 151) — Pass Marks: 24
(Digital Logic) — Time: 3 hours.

Candidates are required to give their answers in their own words as for as practicable.
The figures in the margin indicate full marks.

Long Answer Questions:

Attempt any TWO questions. **(2x10=20)**

1. Design the 4 bit Synchronous up/down counter with timing diagram, logic diagram and truth table.
2. Design a Full subtractor with truth table and logic gates.
3. Design a decimal adder with logic diagram and truth table.

Short Answer Questions:

Attempt any EIGHT questions. **(8x5=40)**

4. Differentiate between Analog and Digital system.
5. Convert the following octal numbers to hexadecimal.
   a) 1760.46
   b) 6055.263
6. Which gates can be used as inverters in addition to the NOT gate and how?
7. Draw a logic gates that implements the following
   a) $A = (Y_1 \oplus Y_2)(Y_3 \odot Y_4) + (Y_5 \oplus Y_6 \oplus Y_7)$
   b) $A = (X_1 \odot X_2) + (X_3 \odot X_4) + (X_4 \odot X_5) \oplus (X_6 \odot X_7)$
8. State and prove De-Morgan's theorem 1st and 2nd with logic gates and truth table.
9. Reduce the following expressions using K map
   a. $\bar{A} + B(A + \bar{B} + D)(\bar{B} + C)(B + C + D)$
10. Differentiate between a MUX and DEMUX.
11. Explain the operation of Decoder.
12. What are the various types of shift registers?
13. What do you mean by synchronous counter?

Tribhuvan University
Institute of Science and Technology
2067

✡

Bachelor Level/ First Year/ Second Semester/ Science — Full Marks: 60
Computer Science and Information Technology (CSC 151) — Pass Marks: 24
(Digital Logic) — Time: 3hours

Candidates are required to give their answers in their own words as for as practicable.
The figures in the margin indicate full marks.

Long Answer Questions:
Attempt any two questions. (2x10=20)

1. What is magnitude comparator? Design a logic circuit for a 4-bit magnitude comparator and explain it.
2. What do you mean by full adder and full subtractor? Design a 3 to 8 line decoder using two 2 to 4 line decoder and explain it.
3. What is JK master slave flip-flop? Design its logic circuit, truth table and explain the working principle.

Short Answer Questions:
Attempt any eight questions. (8x5=40)

4. Convert the following hexadecimal number to decimal and octal numbers
   (a) 0FFF (b) 3FFF
5. Design a half adder logic circuit using NOR gates only.
6. Proof the 1st and 2nd law of De Morgan's theorems with logic gate and truth table.
7. What do you mean by universal gate? Realize the following logic gates using NOR gates.
   (a) OR gate (b) AND gate
8. Draw a logic circuit of 4x1 multiplexer.
9. What is a flip-flop? Mention the application of flip-flop.
10. Explain the Ripple Counter.
11. Design the Decimal Adder.
12. What do you mean by shift registers? Explain.
13. Write short notes on (any two):
    (a) Decoder
    (b) Integrated circuit
    (c) PLA.

Prepared By ASCOL CSIT 2070 Batch

Tribhuvan University
Institute of Science and Technology
2068

✡

Bachelor Level/ First Year/ Second Semester/ Science — Full Marks: 60
Computer Science and Information Technology (CSC 151) — Pass Marks: 24
(Digital Logic) — Time: 3hours

Candidates are required to give their answers in their own words as for as practicable.
The figures in the margin indicate full marks.

Long Answer Questions:
Attempt any two questions. (2x10=20)

1. Draw a block diagram, truth table and logic circuit of 1X16 Demultiplexer and explain its working principle.
2. Design a 3 bit synchronous counter and explain it.
3. What is magnitude comparator? Design a logic circuit for 4 bit comparator and explain it.

Short Answer Questions:
Attempt any eight questions. (8x5=40)

4. Design a half subtractor circuit using only NAND gates.
5. Convert the following decimal numbers into Hexadecimal and Octal number.
    a) 504
    b) 250
6. Design an encoder using universal gates.
7. What do you mean by D-flip-flop?
8. What is sequential logic? What are the important features?
9. Simplify the Boolean function using k-maps.

$$F = X'yz + X'yz' + Xy'z + Xy'z$$

10. Draw a parallel-in-parallel out shift register and explain it.
11. Explain the 4-bit ripple counter.
12. Explain the programmable logic array (PLA)
13. Write short notes on:
    a) Asynchronous counter
    b) Multiplexers
    c) State reduction table

IOST, TU

Prepared By ASCOL CSIT 2070 Batch

Tribhuvan University

Institute Of Science and Technology

2069

✡

Computer Science and Information Technology (CSc. 151)
(Digital Logic)

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Long Answer Questions:
Attempt any two questions. (2x10=20)

1. What is a decoder? Implement the following using decoder.

   a) F (W X Y Z) = $\sum (0, 1, 3, 4, 8, 9, 10)$

   b) F (W X Y Z) = $\sum (1, 3, 5, 6, 11, 13, 14)$

2. What do you mean by asynchronous counter? Design a mod-6 synchronous counter using T Flip-flops.

3. Explain the Master-slave S-R Flip-flop with logic diagram, truth table and timing diagram.

Short Answer Questions:
Attempt any eight questions: (8x5=40)

4. Design a Half subtractor using only NOR gates.

5. Convert the following decimal numbers into Hexadecimal and Octal number.
   a) 220
   b) 1020

6. Design a multiplexer 4 x 1 using only universal gates.

7. What is J – K flip flop? Explain.

8. Write a procedure to reduce K- maps.

9. What are the various types of shift registers?

10. Draw a logic diagram of a 4 bit ripple counter using D- flip flop.

11. Differentiate between combinational logic and sequential logic. List some applications of sequential logic.

12. Explain the decimal adder.

13. Write short notes on:

    a) Programmable logic array (PLA)

    b) Triggering at flip-flop

    c) Memory unit

IOST, TU

Tribhuvan University

Institute Of Science and Technology

2070

✡

Computer Science and Information Technology (CSc. 151)
(Digital Logic)

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Long Answer Questions:
Attempt any two questions. (2x10=20)

1. Explain magnitude comparator and also design a logic diagram for a 4 bit magnitude comparator.
2. What do you mean by ripple counter? Explain with timing diagram.
3. Explain the full subtractor with using decoder.

Short Answer Questions:
Attempt any eight questions. (8x5=40)

4. Design a half adder logic using only NAND gates.
5. Convert the following decimal numbers into hexadecimal and octal.
   (a) 334 (b) 225
6. Explain the k-map with three variables.
7. Explain the combination logic with examples.
8. Differentiate between Multiplexer and Demultiplexer.
9. Mention the difference types of shift registers.
10. What do you mean by Ripple counter?
11. Explain the decoder and design with universal gates.
12. What do you mean by clocked RS flip – flop? Explain.
13. Write short notes on (any two):
    (a) Flip flop
    (b) Synchronous counter
    (c) Digital systems

IOST, TU

Tribhuvan University

Institute Of Science and Technology

2071

✡

Computer Science and Information Technology (CSc. 151) Full Marks: 60

(Digital Logic) Pass Marks: 24

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Long Answer Questions:
Attempt any two questions. (2x10=20)

1. What are the various types of numbering systems use in digital logic? Explain. Convert the $3EC8_{16}$ into different numbering system that you know.
2. Design the mod – 6 asynchronous counter and explain with truth table.
3. What is demultiplexer? Draw its block diagram and explain its working principle.

Short Answer Questions:
Attempt any eight questions. (8x5=40)

4. Convert the hexadecimal number 2BCF to binary and then to octal.
5. Proof the De-Morgan 1st and 2nd theorem with truth table and logic gates.
6. Simplify the following Boolean function using three variables K-map.
   (a) F(X, Y, Z)=∑(0, 3, 2, 5)
   (b) F(A, B, C)=∑(0, 2, 4, 5, 6)
7. Simplify the Boolean expression.
   $Y = \overline{A.B} + \overline{\bar{A} + \bar{B}}$
   Prepare truth table to show that the simplified expressions is correct or not?
8. Explain the PLA (Programmable Logic Array).
9. How JK flip flop can convert into a D – flip flop? Explain.
10. What do you mean by synchronous counter? Explain with truth table.
11. Draw a 3 to 8 decoder circuit and explain its operation.
12. Mention the difference types of shift registers and explain.
13. Write short notes on:
    (a) CMOS
    (b) Universal gates
    (c) Error detection code

IOST, TU

TRIBHUVAN UNIVERSITY
Institute of Science and Technology
2072
✡

Bachelor Level/ First Year/ Second Semester/ Science — Full Marks: 60
Computer Science and Information Technology (CSc. 151) — Pass Marks: 24
(Digital Logic) — Time: 3 hours.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Long answer Questions:
Attempt any two questions. **(2x10=20)**

1. Design and Implement with logic diagram, truth table and timing diagram of synchronous 3 bit up/down counter using J-K Flip Flops.
2. Design a Magnitude comparator using logic gates and truth table.
3. Design a Master-slave S-R flip-flop with logic diagram and truth table.

Short Answer Questions:
Attempt any eight questions. **(8x5=40)**

4. What do you mean by the Gray code? What are its applications?
5. Convert the following:
   a) $(A08E.FA)_{16} = (?)_{10}$
   b) $(AE9.BOE)_{16} = (?)_{2}$
6. State and prove commutative laws, associative laws and distributive laws using logic gates and truth table.
7. Show that both NAND gate and NOR gate are universal gates.
8. Proved that
   a) $\overline{ABC}(\overline{A+B+C}) = ABC$
   b) $A+\overline{B}C(A+\overline{\overline{B}C}) = A$
9. Reduce the following expressions using K- map.
   a) $(A+B)(A+\overline{B}+C)(A+\overline{C})$
   b) $A+B(A+\overline{B}+D)(B+\overline{C})(B+C+D)$
10. How does a J-K Flip-Flop differ from an S-R Flip-Flop in its basic operation? Explain.
11. Differentiate between a counter and a shift register.
12. Design a 4 input Multiplexer using logic diagram and truth table.
13. Explain the serial-In, Parallel out shift register.