Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back/Scholarship Exam – 2081/2082 Chaitra/Baishakh

Program:	**Diploma in Computer Engineering/ Diploma in Information Technology**	**Full Marks: 80**
Year/Part:	**II/I (2022)**	**Pass Marks: 32**
Subject:	**Digital Logic**	**Time: 3 hrs.**

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

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Attempt any FIVE questions.

1. a. Define signal. Write down the advantages of digital signal over analog signal. [1+3]

   b. Convert the following number system: [4×2]

   i. $(10110.011)_2=(?)_{10}$ ii. $(3462)_8=(?)_{16}$

   iii. $(AFCD.2E)_{16}=(?)_8$ iv. $(69273.58)_{10}=(?)_2$

   c. Subtract the following $(00110011)_2$ from $(0110101)_2$ using 2's complement method. [4]

2. a. Define logic gate. Explain the basic gates with necessary truth table, symbol and logical expression. [2+6]

   b. State and prove De-Morgan's theorem with necessary truth table and diagram. [5]

   c. Simplify the following expression using Boolean algebra: [2×1.5]

   i. $x'y + yz' + yz + xy'z' = y + xz'$

   ii. $Y = ABCD + AB\bar{C}D + A\bar{B}C + AC\bar{D}$

3. a. Define universal gate. Realize the basic gates using NAND gate only with clear figure and truth table. [2+6]

   b. Simplify the following expression using K-map: [4+4]

   i. $F(A, B, C, D) = \sum m(1, 3, 4, 6, 8, 9, 11, 13, 15) + \sum d(0, 2, 14)$

   ii. $F(A, B, C, D) = \sum m(3, 5, 7, 8, 10, 11, 12, 13)$

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Cont. .....

4. a. Define adder. Explain the decimal to BCD encoder with suitable diagram and truth table. [2+6]

   b. Define decoder. Explain full subtractor with necessary truth table, diagram and logical expression. [2+6]

5. a. Design JK flip flop with necessary diagram. Explain master slave flip flops. [6+2]

   b. Define counter. Explain ripple counter with truth table and waveform. [2+6]

6. Write short notes on: (any **FOUR**) [4×4]

   a. SISO shift register

   b. X-OR gate

   c. Seven segment display

   d. T-flip flop

   e. BCD code

   f. 1:4 de-multiplexer

Good Luck !

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Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back/Scholarship Exam-2080/2081, Chaitra/Baishakh

Program:	**Diploma in Computer Engineering/ Diploma in Information Technology**	**Full Marks: 80**
Year/Part:	**II/I (2022)**	**Pass Marks: 32**
Subject:	**Digital Logic**	**Time: 3 hrs.**

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

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Attempt ALL questions.

1. a. List the applications of digital signal. Differentiate between analog and digital signals. [1+4]

   b. Convert the following: [4×2]

   i. $(257.526)_{10}=(?)_{16}$ ii. $(1011001.100)_2=(?)_8$

   iii. $(425.18)_{10}=(?)_2$ iv. $(AB.2AC)_{16}=(?)_{10}$

   c. Subtract 1011 from 101 using 2's complement method. [5]

2. a. Perform $(11001+11100)_2$, subtract $(350)_2$ from $(25)_{10}$ using 9's complement method. [1+3]

   b. What are basic gates? Explain the universality of NOR gates with figures. [1+5]

OR

State and prove De-Morgan's theorem with truth table and figures. [6]

   c. Describe OR and XOR gates with truth table, symbol and logical expression. [1+3]

OR

Describe NOT and XNOR gates with truth table, symbol and logical expression. [1+3]

3. a. What do you mean by Boolean algebra? Simplify the following Boolean expression. [2+3+3]

   i. $(A+B)(A+C)$ ii. $AB(\bar{B}C+AC)$

Cont. .....

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b. Simplify the following expression using k-map. [6+3]

i. $F(A,B,C,D) = \sum m(0,1,2,3,7,8,9,10,11) + \sum d(6,14,15)$

ii. $F(A,B,C) = \pi(0,2,4,6)$

4. a. What is combinational logic circuit? Design a 1 to 4 de-multiplexer with circuit diagram. [1+4]

OR

Design a decimal to binary encoder with circuit diagram and truth table. [5]

b. Explain the operation of full adder circuit with truth table and logic diagram. [5]

5. a. Define encoder. Design BCD to decimal decoder with circuit diagram and truth table. [1+5]

b. What is flip flop? Explain T-flip flop with its truth table. [1+4]

6. Write short notes on: (any **TWO**) [2×5]

a. Ripple counter

b. Seven segment display

c. SIPO shift register

d. Ring counters

Good Luck !

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Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Back Exam-2080 Mangsir/Poush (Scholarship)

Program: Diploma in Information Technology | **Full Marks: 80**

Year/Part: I/II (2016) | **Pass Marks: 32**

Subject: Digital Logic | **Time: 3 hrs.**

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Attempt any TEN questions.

1. Define analog and digital signal in short. Mention the advantages of digital signal over analog signal. [4+4]
2. Explain binary number system. Convert the following: [2+6]
   i. $(1011)_2=(?)_{10}$ ii. $(37)_{10}=(?)_2$
   iii. $(BAF)_{16}=(?)_{10}$
3. Explain D–flip flop and T flip flop with their truth table. [4+4]
4. Define shift registers. Explain SISO and SIPO shift registers. [2+6]
5. What are counters? Explain ripple counter. [2+6]
6. What are decoders? Explain 4 to 1 multiplexer and 1-to-4 demultiplexer. [2+3+3]
7. Perform the following: [4×2]
   i. $(1000)_2+(1101)_2$ ii. $(101)_2-(01)_2$
   iii. $(1111)_2\div(101)_2$ iv. $(1011)_2\times(101)_2$
8. What do you mean by logic families? Introduce TTL, ECL and RTL families in short. [2+6]
9. What do you mean by universal gates? Explain the universal properties of NAND gate. [2+6]
10. Minimize the following expression: [8]
    $F = \sum m\,(0,7,8,9,10,12) + \sum d\,(2,5,13)$; using k-map.
11. Differentiate combinational and sequential logic circuit with example. Explain 7-segments display. [4+4]
12. Write shot notes on: (any **TWO**) [2×4]
    a. Full Adder
    b. SOP and POS
    c. Alphanumeric Code
    d. Master Slave JK flip flop

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Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Scholarship Exam-2080 Bhadra

Program: **Diploma in Information Technology/ Computer Engineering** — **Full Marks: 80**

Year/Part: **II/I (2022)** — **Pass Marks: 32**

Subject: **Digital Logic** — **Time: 3 hrs.**

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

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Attempt any FIVE questions.

1. a. Define signal. Differentiate between analog and digital signal with suitable example. [1+3]

   b. Convert the following number system: [4×2]

   i. $(10111.01)_2=(?)_{10}$ ii. $(3471)_8=(?)_{16}$

   iii. $(BCDE.4A)_{16}=(?)_8$ iv. $(3567.350)_{10}=(?)_2$

   c. Perform the following operation: [2×2]

   i. Multiply: $(11101.11*101)_2$

   ii. Divide: $(110100.110/110)_2$

2. a. Subtract the following $(11001100)_2$ from $(11110000)_2$ using 2's complement. [4]

   b. Realize basic gate using NAND gate only with clear diagram and truth table. Also, state and prove De-Morgan's Theorem in brief. [4+4]

   c. Explain XOR and NOR gate with truth table and symbol. [4]

3. a. Simplify the following expression using Boolean algebra: [4×2]

   i. $A'B'C' + A'BC' + AB'C' + ABC' = C'$

   ii. $A(A' + C)(A'B + C)(A'BC + C') = 0$

   b. Simplify the following expression using k-map. [4×2]

   i. $\sum f(A,B,C,D) = \pi M(2,3,4,5,7,10,11,14) + \sum d(0,1,6,15)$
   Draw logic diagram.

   ii. $\sum f(A,B,C,D) = \sum m(0,1,4,8,11,12,15) + \sum d(2,3,5,6,7)$
   Draw logic diagram.

4. a. Define encoder. Explain the decimal to binary encoder with suitable diagram and truth table. [2+6]

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Cont. ...

b. Differentiate between combinational and sequential circuit with example. [4]

c. Design 1:4 De-multiplexer with clear circuit diagram and truth table in brief. [4]

5. a. Design RS flip-flop with necessary diagram. Write the advantages of JK flip-flop. [6+2]

b. Define shift register. Explain the operation of ripple counter with clear diagram. [2+6]

6. Write short notes on: (any **FOUR**) [4×4]

a. 7 segments display
b. SIPO shift register
c. D flip-flop
d. Half adder
e. ASCII code
f. BCD code

Good Luck !

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Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2079, Phagun/Chaitra

Program: Diploma in IT Engineering | **Full Marks:** 80

Year/Part: I/II (2016) | **Pass Marks:** 32

Subject: Digital Logic | **Time:** 3 hrs.

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Attempt any FIVE questions.

1. a) Define signal. Differentiate between analog and digital signal with suitable example. [1+3]

   b) Convert the following number system: [4×2]

   i. $(2567.350)_{10} = (?)_2$

   ii. $(BCDE.4A)_{16} = (?)_8$

   iii. $(1100110011)_2 = (?)_{16}$

   iv. $(376.351)_8 = (?)_{10}$

   c) Perform the following operation: [2×2]

   i. Divide: $(1100110011)_2 / (1011)_2$

   ii. Multiply: $(1011001101)_2 \times (101101)_2$

2. a) State and prove De-Morgan's Theorem with necessary diagram and truth table. [8]

   b) Simplify the following expression using Boolean Algebra. [2×4]

   i. $Z(Y + Z)(X + Y + Z) = Z$

   ii. $A'BC + AB'C + ABC + BC'$

3. a) Simplify the following expression using k-map. [2×4]

   i $\sum F(A, B, C, D) = \pi m(2,3,4,5,7,10,11,14) + \sum d(0,1,6,15)$

   ii. $\sum F(A, B, C, D) = \sum M(0,1,4,8,11,12,15) + \sum d(2,3,5,7)$

   b) Realize basic gate using universal NAND gate only with truth table and logic circuit. [8]

4. a) Define multiplexer. Explain the operation of full subtractor with clear logic diagram, truth table and expression. [2+6]

Cont.....

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b) Define encoder. Design and explain seven segment Display decoder with necessary diagram and truth table. [2+6]

5. a) Define counter. Explain the operation of 'T' flip flop with necessary diagram and truth table. [2+6]

b) Define adder. Explain about ripple counter with necessary diagram. [2+6]

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6. Write short notes on: **(Any Four)** [4×4]

a) ASCII Code

b) DTL Logic Family

c) AND & OR Gates

d) 1:4 De-multiplexer

e) SISO Shift Register

Good Luck!

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Council for Technical Education and Vocational Training
Office of the Controller of Examinations
Sanothimi, Bhaktapur
Regular/Back Exam-2078, Magh/Falgun

Program: Diploma in Computer Engineering — **Full Marks:80**

Year/ Part: I/II (2018) — **Pass Marks: 32**

Subject: Digital Logic — **Time: 3 hrs.**

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Attempt Any Five Questions.

1. a) Differentiate analog and digital signals. What do you mean by positive and negative logic. [6+2]

   b) Perform following task : [4x2]

   i Convert $(41.6875)_{10}$ into binary

   ii Convert $(1001)_2$ into BCD

   iii Convert $(1011)_2$ into decimal

   iv Convert $(12AB)_{16}$ into decimal

2. a) Explain about basic gates with necessary truth table and logical expression. [8]

   b) Explain universal gates and why are they called so? Reduce the following expression using k-map. [2+6]

   $F(A,B,C,D,) = \sum(0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$

3. a) State and prove De-Morgan theorem using troth table and logic diagram. Subtract $(11101010)_2$ from $(11111000)_2$ using 2's complement. [5+3]

   b) Explain the working of 8 to 1 multiplexer with necessary diagram and truth table. What do you mean by combinational logic circuit? [6+2]

4. a) Define Boolen Algebra. State and explain basic properties of Boolen Algebra. [2+6]

   b) Design BCD to Decimal decoder with necessary diagram and truth table and mention different types of decoder IC package. [6+2]

5. a) Define latch and flip-flop. Explain JK flip-flop with all necessary diagram ; symbol, truth table. [2+6]

   b) Explain Ripple up counter with timing diagram. [8]

6. Write short notes on : **(Any Four)** [4x4=16]

   i) SISO shift register

   ii) LCD display

   iii) 7- Segment Display

   iv) Half adder

   v) Alphanumeric code

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Good Luck.!

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2077, Chaitra

AC

Program:	**Diploma in Computer Engineering**	**Full Marks: 80**
Year/Part:	**I/II (2018 New Course)**	**Pass Marks: 32**
Subject:	**Digital Logic**	**Time: 3 hrs**

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Attempt Any Eight questions.

1. Differentiate between Analog and digital signal with example. Give brief description about types of number system. [5+5]

2. Perform the following : [5x2=10]

   i) $(625.25)_{10} = (?)_2$ ii) $(12AB5)_{16} = (?)_2$

   iii) $(1001101)_2 = (?)_8$ iv) $(111000)_2 = (?)_{10}$

   v) $(101000110)_2 = (?)_{16}$

3. Define complement. Describe about 9's and 10's complement with suitable example. [2+4+4]

4. Explain briefly about basic gates. Prove that NOR gate as universal gate. [5+5]

5. State and prove De-Morgan's theorem. Differentiate between sum of product (SOP) and product of sum (POS). [5+5]

6. Define algebra with its laws. Simplify the fallowing using K-map: [4+6]

   $F(A,B,C,D) = \Sigma (1,2,4,7,10,12,14) + \Sigma d (6,8,11,13)$

7. What do you mean by Decoder? Design a Decimal to BCD encoder with necessary logic diagram. [3+7]

8. Elaborate about JK and masters-lave flip-flop with its symbol and truth table. [5+5]

9. Compare between synchronous and Asynchronous counter. Explain about SIPO shift register in brief. [5+5]

10. **Write short notes on : (Any Two)** [2x5=10]

    a) Gray Code b) 4-to-1 multiplexer

    c) Ring Counter d) 7-segment display e) Half Adder

Good Luck !

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Council for Technical Education and Vocational Training
Office of the Controller of Examinations
Sanothimi, Bhaktapur

Regular/Back Exam-2076, Shrawan/Bhadra

Program: Diploma in Computer Engineering
Year/Part: I/ II (2018)
Subject: Digital Logic

Full Marks: 80
Pass Marks: 32
Time: 3 hrs

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Attempt **Any Five** questions.

1. a) What do you mean by Propagation delay and Noise Margin? [4]
   b) Convert the following: [2x4=8]
   (i) $(625.256)_{10} = (?)_2$ (iii) $(101101.110)_2 = (?)_{10}$
   (ii) $(101110.101)_2 = (?)_8$ (iv) $(256.625)_{10} = (?)_{16}$
   c) Subtract10111 from 10011 using 2's complement. [4]
2. a) Why we use NOR gate as AND, OR and NOT gate. [6]
   b) State and prove De-Morgan's theorem with suitable diagram and truth table. [6]
   c) Prove using Boolean Expression. (A+B) (A+C) = A+ BC [4]
3. a) Simplify Boolean expression by using logic diagram: [6]
   $Y = ABCD + A\bar{B}\bar{C}D + A\bar{B}C + AC\bar{D}$
   b) Simplify using K-map in SOP & POS form: F(A, B, C, D) = $\sum m(0, 2, 3, 4, 5, 10, 11, 15) + \sum d(1, 6, 9, 13)$. [6]
   c) Compare between combinational logic and sequential logic circuit. [4]
4. a) Define Adder. Explain the full subtractor with truth table and logic diagram. [8]
   b) Design a 8:1 MUX with its symbol, truth table and logic diagram. [8]
5. a) Describe the operation of R-S flop-flip with diagram and necessary table. [4]
   b) Explain about PIPO shift register. [4]
   c) Define Flip-flop. Describe about ripple counter. [2+6]
6. Write short notes on: **(Any Four)** [4x4=16]
   a) BCD code
   b) Master -slow Flip-flop
   c) Seven segment display
   d) Encoder
   e) Ring counter

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Good Luck!

Council for Technical Education and Vocational Training
Office of the Controller of Examinations
Sanothimi, Bhaktapur

Regular/ Back 2075 Shrawan / Bhadra

Program: Diploma in Computer Engineering / Information Technology
Full Marks: 80

Year/ Part: I/II(DIT old Course)
Pass Marks: 32

Subject: Logic Circuit
Time: 3 hrs.

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Attempt (All) Questions.

1. (a) Differentiate between analog and digital signal with example. [2+2]

   (b) Convert the following. [2x2]

   i. $(1234)_{10}$ into binary

   ii. $(10110101.01011)_2$ in to decimal

2. (a) Convert the following number system as indicated: $(11011.101)_2 = (?)_{10}$ [10]

   (b) Subtract 11011 from 11001010 suing first complement method [3]

3. (a) What is NAND gate? Draw it's symbol. Write the true table and logic equation for it. [6]

   (b) State and prove the De-Morgan's theorem with necessary table and diagram. [6]

4. (a) Simplify using k-map in sum product (SOP) and product of sum (POS) from. $F(A,B,C,D)= \sum(1,5,12,14,15)$ and don't care condition. $D(A,B,C,D)= \sum(0,3,4,6,10)$. [3+3]

   (b) Differentiate between combinational logic circuit and sequential logic circuit [6]

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5. (a) Explain about Half adder and half adder SOL - stractors' with examples. [6]

Contd.....

(b) Prove the following equation by using Boolean algebra. i) X×X=X ii) X+XY=X [2×3]

OR

Design a 3 bits combination of circuit whose output Y = 1 when the input binary is greater than or equal to 6.

6. (a) Simplify the following expression and realize it using different gates. [8]

AB'C+AB+AD'+ABCD+AC'.

OR

What is a Decoder? Explain BCD to seven segment decoder with truth table

(b) Explain the T Flip-Flop with logic diagram and necessary tables. [6]

7. (a) Define multiplexer. Explain about the serial in serial out shift register. [4+2]

OR

Define counter. Explain about Ripple counter with diagram.

(b) Write short notes (any three) [3×3=9]

i. Grey Code
ii. Universal Gate
iii. 1-4 De-multiplexer
iv. LCD display

Good luck !

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Council for Technical Education and Vocational Training
Office of the Controller of Examinations
Sanothimi, Bhaktapur
Regular/Back Exam-2074, Shrawan/Bhadra

Program: Diploma in Computer Engineering | **Full Mark: 80**
Year/Part: I/II | **Pass Mark: 32**
Subject: Logic Circuits | ***Time: 3 hrs.***

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Attempt any ten Questions.

1. Differentiate between analog and digital signal. Explain the applications of digital signal. [4+4]
2. Explain Octal and Hexadecimal number system. Convert following numbers into specified number system. [4+4]
   a) $(101)_{10} = (?)_2$ b) $(564)_8 = (?)_{16}$
3. Divide $(1011010)_2$ by $(111)_2$. Subtract $(1101)_2$ to $(111)_2$ using 2's complement method. [4+4]
4. Explain AND, OR and NOT gates with its truth table and gate diagrams. What are universal gates? Explain. [6+2]
5. Define Boolean Algebra and write down its properties. Explain DeMorgan's Theorems. [3+5]
6. Explain K-Map simplification for two input variable and three input variable with example. [8]
7. Explain Half adder and full adder logic circuits with its combinational circuit diagram. [8]
8. What are decoders? Explain 4-to-1 multiplexer and 1-to-4 demultiplexer. [2+6]
9. Explain RS Flip-Flop and JK Flip-Flop with their truth table. [8]
10. Define shift registers. Explain SISO and SIPO shift registers. [2+6]
11. What are counters? Explain Ripple counters. Write down the applications of counters. [2+3+3]
12. Write short notes on: **(Any two)** [4*2=8]
    a. LCD display
    b. Applications of Flip-Flop
    c. Encoders
    d. Alphanumerical display

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Good Luck!

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2073 Bhadra/Ashwin

Program: Diploma in Information Technology /Computer Engineering — **Full Mark:60**

Year/Part: I/II(New Course) — **Pass Mark:24**

Subject: Logic Circuits — ***Time: 3 hrs.***

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Attempt Any Five (5) Questions.

1	a) Define Signal. Differentiate between analog and digital signal with suitable example.	[2+4=6]
	b) Convert the following number system. i. $(2564.87D)_{16} = (?)_2$ ii. $(4432.123)_8 = (?)_{16}$ iii. $(111101010*11010)_2$ iv. $(1101001.110)_2 / (110)_2$	[1x4=4]
	c) Subtract the following $(11101010)_2$ from $(111110000)_2$ using 2's Compliment.	[2]
2.	a) Explain about AND and OR gate with necessary truth table , symbol and logical expression.	[3+3]
	b) Define Universal gate. Explain how NOR gate operate as Basic gate with necessary realization technique.	[1+5]
3.	a) Simplify the following expression using K- map. $\Sigma F(A,B,C,D) = \Sigma m(0,1,3,4,7,8,12,15)$ $\Sigma d\ (2,5,6,14)$	[6]
	b) Define Adder. Explain the operation of Full adder with clear diagram and truth table.	[1+5]
4.	a) Define Encoder. Design BCD to decimal decoder with clear circuit diagram and truth table.	[1+5]
	b) Design 8:1 Multiplexer with clear circuit diagram and truth table.	[6]
5.	a) Define Flip-flop. Explain the operation of JK flip flop with necessary diagram and truth table.	[1+5]
	b) Define counter. Explain the operation of ripple counter with clear diagram	[1+5]

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6.	Write short notes on : (Any Four)	[4x3=12]
	a) LCD display b) SISO shift register c) Gray code d) De Morgan's theorem e) Demultiplexer	

Good Luck!

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Council for Technical Education and Vocational Training
Office of the Controller of Examinations
Sanothimi, Bhaktapur

Regular/ Back Exam 2072, Bhadra/Ashwin

Program : Diploma in Computer Engineering **Full Marks: 80**

(New Course)

Year/ Part : I/II **Pass Marks: 32**

Subject : Logic Circuits **Time: 3 hrs.**

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Attempt (Any Eight) Questions.

1. Explain the importance of digital signal over analog signal with examples. [10]

2. (a) Discuss about the different number system in brief. [5]

   (b) Convert $(AB.52)_{16}$ into Octal number. [5]

3. What is BCD code? Write on the alpha numeric code. [5+5=10]

4. Why NAND and NOR gates are called universal gates? Realize the basic logical gate using NAND gate. [4+6=10]

5. What is K-map? Explain sum of product and product of sum simplification. [4+3+3=10]

6. Design a decimal to BCD decoder with diagram. [10]

7. What is multiplexing? Design 8:1 multiplex with neat sketch diagram. [2+8=10]

8. Define the term "flip-flop". Explain different types of flip-flop in brief. [2+8=10]

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9. Writhe short notes on: (Any Two) [2x5=10]

   a) SISO shift register

   b) Decade counter

   c) LED display

   d) 2's complement method.