Digital Electronics™
Final Examination

More Practice Questions

Student Name: _____

Date: _____

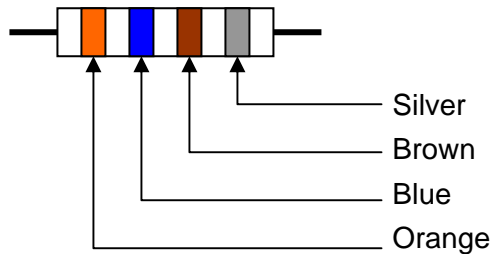**Class Period:** _____

Total Points: _____/50

Converted Score: _____/40

Directions: This is a **CLOSED BOOK/CLOSED NOTES** exam. Select the letter of the response which best completes the item or answers the question. Then record your answer on the answer sheet provided for Part A.

2. After reading a digital meter, a technician obtained a reading of 0.0073 volts. Which of the following numbers is the proper engineering notation for that number?

   A. 7.3 m Volts

   B. 7.3 μ Volts

   C. 0.0073 μ Volts

   D. 7.3 K Volts

3. What is the value of the resistor shown below?

   Silver
   Brown
   Blue
   Orange

   A. 160 K Ω ±10 %

   B. 360 Ω ±5 %

   C. 360 Ω ±10 %

   D. 36 K Ω ±5 %

5. In a series circuit, you measure 9 volts across a 300 Ω resistor. How much current is flowing through the resistor?

   A. 30 m Amps

   B. 33.33 Amps

   C. 300 m Amps

   D. 3 m Amps

7. What is the binary equivalent to the decimal number 13_{10}?

    A. 1101_2 **C.** 1011_2

    B. 0111_2 **D.** 1001_2

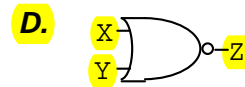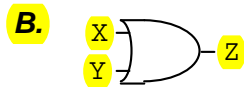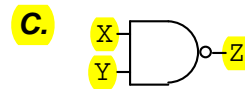9. What is the binary equivalent to the hexadecimal number C_H?
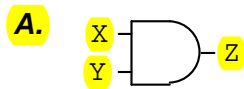
    A. 1000_2 **C.** 1001_2

    B. 0110_2 **D.** 1100_2

10. The truth-table shown below represents which of the following gates?

X	Y	Z
0	0	0
0	1	1
1	0	1
1	1	1

A. X, Y → Z (AND gate)

B. X, Y → Z (OR gate)

C. X, Y → Z (NAND gate)

D. X, Y → Z (NOR gate)

12. The truth-table shown below represents which of the following gates?

X	Y	Z
0	0	1
0	1	0
1	0	0
1	1	0

A. X, Y → Z (AND gate)

B. X, Y → Z (OR gate)

C. X, Y → Z (NAND gate)

D. X, Y → Z (NOR gate)
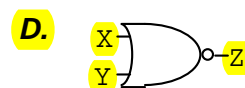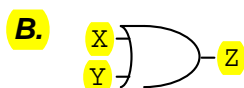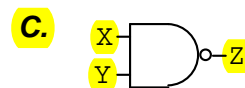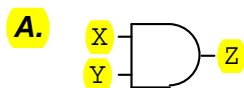
13. The gate shown to the right is represented by which of the following truth-tables?

A.

X	Y	Z
0	0	0
0	1	0
1	0	0
1	1	1

C.

X	Y	Z
0	0	0
0	1	1
1	0	1
1	1	1

B.

X	Y	Z
0	0	1
0	1	1
1	0	1
1	1	0

D.
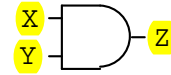
X	Y	Z
0	0	1
0	1	0
1	0	0
1	1	0

14. The gate shown to the right is represented by which of the following truth-tables?

A.

X	Y	Z
0	0	0
0	1	0
1	0	0
1	1	1

C.

X	Y	Z
0	0	0
0	1	1
1	0	1
1	1	1

B.

X	Y	Z
0	0	1
0	1	1
1	0	1
1	1	0

D.
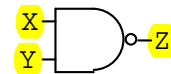
X	Y	Z
0	0	1
0	1	0
1	0	0
1	1	0

15. Which of the following is a rule of Boolean algebra?

A. $X \bullet \overline{X} = \overline{X}$

C. $X + \overline{X} = 0$

B. $X \bullet X = X$

D. $X + X = 1$

16. Which of the following is a rule of Boolean algebra?

A. $A + 1 = A$

C. $A + 1 = 1$

B. $A + 0 = 1$

D. $A + \overline{A} = 0$

17. Which of the following is the simplified equivalent for the Boolean equation shown?

$$F = \overline{Y} + X\,\overline{Y}$$

A. $F = X\,Y$ **C.** $F = X\,\overline{Y}$

B. $F = X$ **D.** $F = \overline{Y}$

18. Which of the following equations is the un-simplified Sum-Of-Products equation for the truth table shown?

X	Y	Z	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

A. $F = \overline{X}\,\overline{Y}\,Z + \overline{X}\,Y\,\overline{Z} + X\,Y\,\overline{Z}$ **C.** $F = \overline{X}\,\overline{Y}\,Z + \overline{X}\,\overline{Y}\,Z + X\,Y\,\overline{Z}$

B. $F = \overline{X}\,\overline{Y}\,Z + \overline{X}\,Y\,\overline{Z} + X\,\overline{Y}\,Z$ **D.** $F = X\,\overline{Y}\,\overline{Z} + \overline{X}\,Y\,\overline{Z} + X\,Y\,\overline{Z}$

19. Which of the following un-simplified Boolean expressions represent the logic circuit shown below?
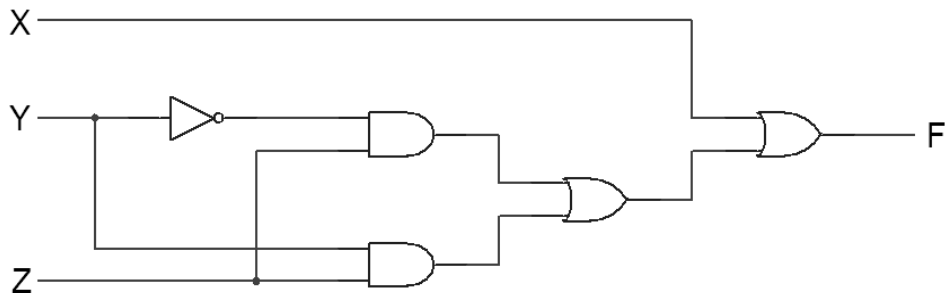
A. $F = X + \overline{Y}\,Z + \overline{Y}\,\overline{Z}$ **C.** $F = X + Y\,\overline{Z} + Y\,Z$

B. $F = X + \overline{Y}\,Z + Y\,Z$ **D.** $F = \overline{X} + \overline{Y}\,Z + Y\,Z$

21. Which of the following is the simplified equivalent for the Boolean equation shown?

$$F = \overline{X + \overline{Y}}$$

A. $F = \overline{X}\,Y$

B. $F = X + \overline{Y}$

C. $F = X\,\overline{Y}$

D. $F = \overline{X}\,\overline{Y}$

22. Which of the following K-Maps has the 1's & 0's properly placed for the function F_{20} ?

W	X	Y	Z	F
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

A.

	$\overline{W}\,\overline{X}$	$\overline{W}\,X$	$W\,X$	$W\,\overline{X}$
$\overline{Y}\,\overline{Z}$	0	0	1	1
$\overline{Y}\,Z$	0	1	0	1
$Y\,Z$	1	1	0	0
$Y\,\overline{Z}$	0	0	1	0

C.

	$\overline{W}\,\overline{X}$	$\overline{W}\,X$	$W\,X$	$W\,\overline{X}$
$\overline{Y}\,\overline{Z}$	0	0	1	0
$\overline{Y}\,Z$	0	1	1	0
$Y\,Z$	1	0	0	1
$Y\,\overline{Z}$	1	1	0	0

B.

	$\overline{W}\,\overline{X}$	$\overline{W}\,X$	$W\,X$	$W\,\overline{X}$
$\overline{Y}\,\overline{Z}$	0	0	0	1
$\overline{Y}\,Z$	0	1	0	1
$Y\,Z$	1	1	0	0
$Y\,\overline{Z}$	1	0	1	0

D.

	$\overline{W}\,\overline{X}$	$\overline{W}\,X$	$W\,X$	$W\,\overline{X}$
$\overline{Y}\,\overline{Z}$	0	0	0	1
$\overline{Y}\,Z$	0	1	0	1
$Y\,Z$	1	0	1	0
$Y\,\overline{Z}$	1	1	0	0

23. Which of the following logic circuits correctly implements the Boolean equation?

$$F = \overline{Y} Z + Y \overline{Z}$$

A.

C.

B.

D.
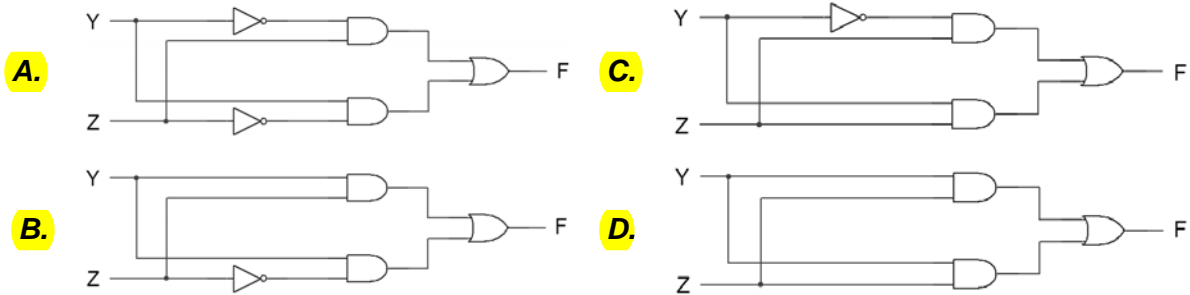
24. Which of the following K-maps is grouped properly and will result in the simplest solution?

A.

	$\overline{X}\overline{Y}$	$\overline{X}Y$	XY	$X\overline{Y}$
$\overline{Z}$	1	0	X	0
Z	1	X	X	1

C.

	$\overline{X}\overline{Y}$	$\overline{X}Y$	XY	$X\overline{Y}$
$\overline{Z}$	1	0	X	0
Z	1	X	X	1

B.

	$\overline{X}\overline{Y}$	$\overline{X}Y$	XY	$X\overline{Y}$
$\overline{Z}$	1	0	X	0
Z	1	X	X	1

D.

	$\overline{X}\overline{Y}$	$\overline{X}Y$	XY	$X\overline{Y}$
$\overline{Z}$	1	0	X	0
Z	1	X	X	1

25. Which Boolean equation is in Product-Of-Sums form?

A. $F = X Y \overline{Z} + X \overline{Y} + X Y Z$

C. $F = (X + Y)(X + Z)(\overline{Y} + Z)$

B. $F = X \overline{Y} \overline{Z} + Z(X + Y)$

D. $F = X Z(Y + Z)(\overline{Y} + Z)$

26. Which of the following Boolean equation is in Sum-Of-Products form?

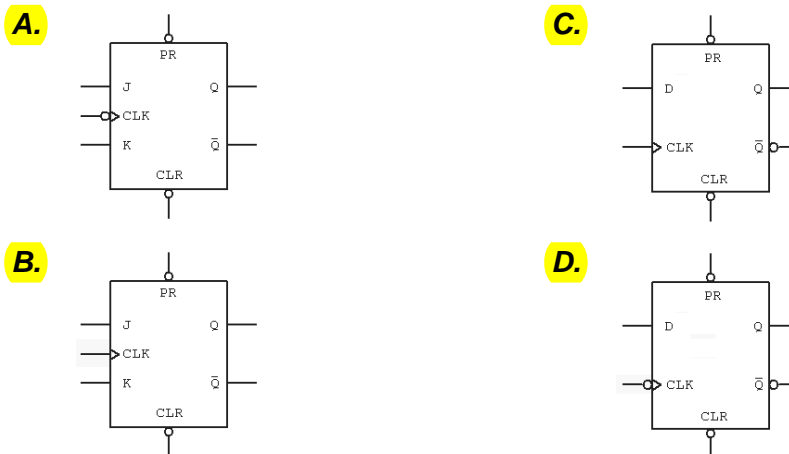**A.** $F = A \overline{B} C + \overline{A} B \overline{C} + A \overline{C}$

C. $F = (\overline{A} + B + \overline{C})(\overline{A} + C)(A + \overline{B} + C)$

B. $F = \overline{A} B C + A (\overline{B} + C)$

D. $F = \overline{A} (B + C) + A (\overline{B} + C)$
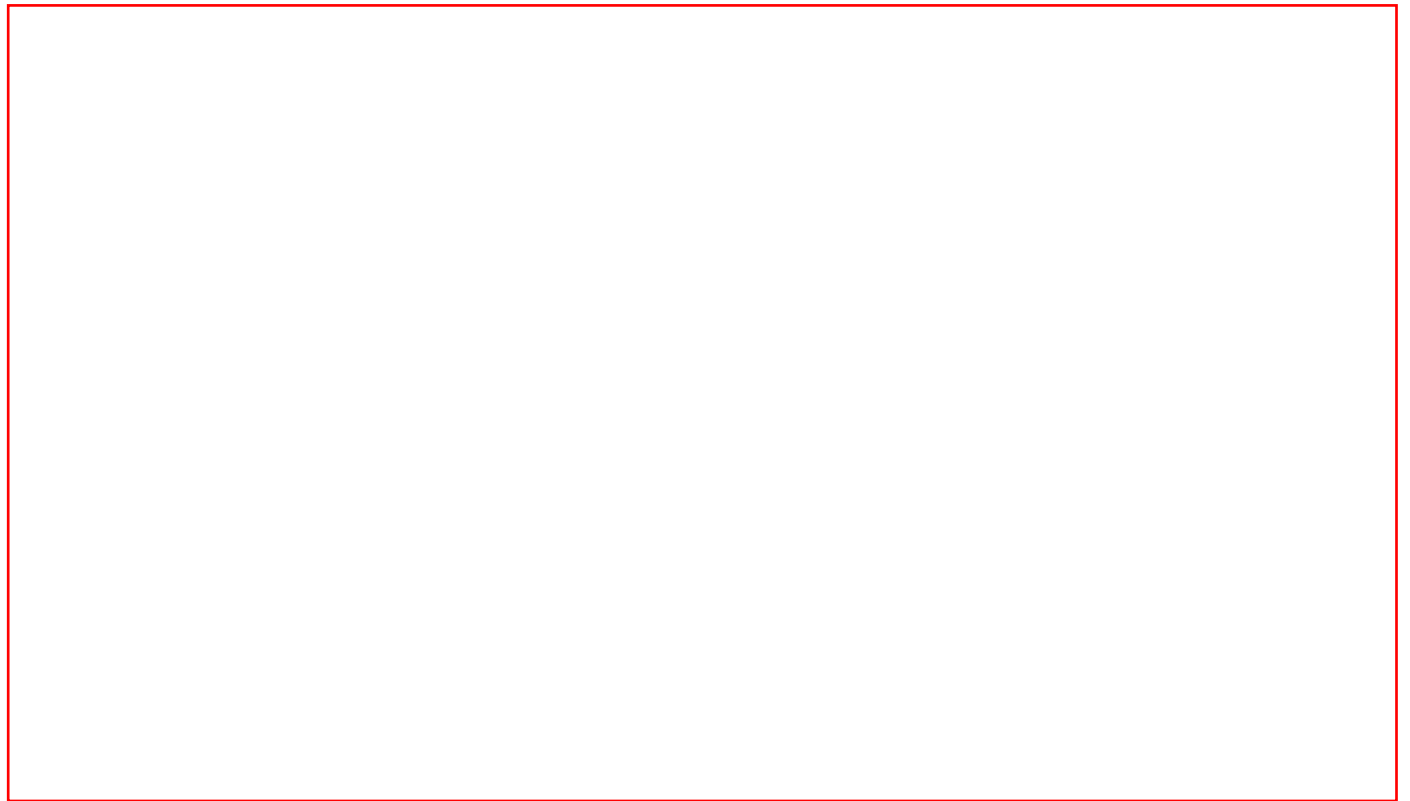
29. Which of the following circuits is a half-adder?

A.

C.

B.

D.
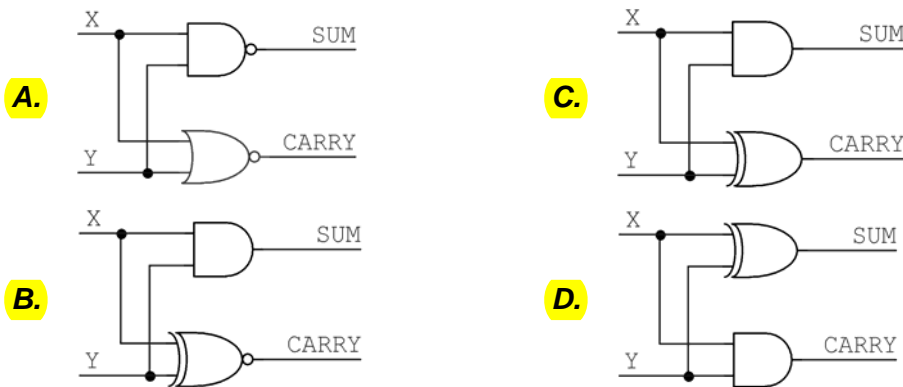
30. Which of the devices shown below is a Negative Edge Triggered D flip-flop?

A.

C.

B.

D.

31. How are the Q and $\overline{Q}$ outputs of a flip flop affected by setting the active high *asynchronous* PRESET input to a logic one?

A. No change.

C. $Q=0$ and $\overline{Q}=1$

B. $Q=1$ and $\overline{Q}=0$

D. $Q=1$ and $\overline{Q}=1$

32. How are the Q and $\overline{Q}$ outputs of a flip flop affected by setting the active low *asynchronous* CLEAR input to a logic zero?
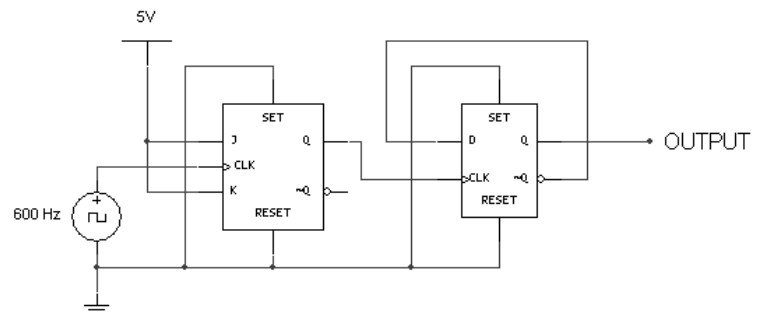
A. No change.

C. $Q=0$ and $\overline{Q}=1$

B. $Q=1$ and $\overline{Q}=0$

D. $Q=1$ and $\overline{Q}=1$

33. Regardless of its current value, what will happen to the output **QUE** on the next clock pulse?

5V

PR

D   Q   QUE

CLK   Q̄

CLR
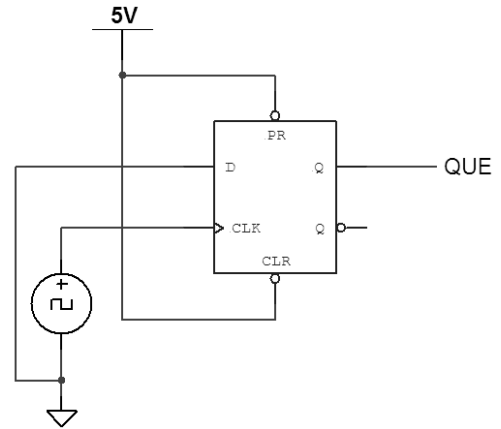
A. QUE will be low.   **C.** QUE will toggle.

B. QUE will be high.   **D.** QUE will not change.

35. Determine the output frequency for the circuit shown to the right.

5V

SET

J   Q

CLK

K   ~Q

RESET

600 Hz

SET

D   Q   OUTPUT

CLK   ~Q

RESET

A. 150 Hz.   **C.** 300 Hz.

B. 600 Hz.   **D.** 450 Hz.

36. What is the minimum number of flip-flops needed to build a Mod-10 Asynchronous counter?

 A. 3

 B. 5

 C. 4

 D. 10

39. When comparing TTL logic gates to CMOS gates, which of the following statements is true?

 A. CMOS gates use more power than TTL gates.

 B. CMOS gates are faster than TTL gates.

 C. CMOS gates are more sensitive to static electricity than TTL gates.

 D. CMOS gates have a lower margin than TTL gates.

40. Propagation delay is _____.

A. a measure of the ability of a logic gate to drive further logic gates.

C. the difference between what a logic gate outputs as a valid logic voltage and what the input of the next gates expects to see as a valid logic voltage.

B. the difference in chip temperature from when the power is off to when the power is on.

D. the time required for a signal to travel from the input of a logic gate to the output.