Summary in Graph

Exam Summary (GO Classes Test Series 2024 | Digital Logic | Test 1)

Qs. Attempted:	**12** 5 + 7	**Correct Marks:**	**10** 4 + 6
Correct Attempts:	**7** 4 + 3	**Penalty Marks:**	**1.33** 0 + 1.33
Incorrect Attempts:	**5** 1 + 4	**Resultant Marks:**	**8.66** 4 + 4.66

Total Questions:	**15** 5 + 10
Total Marks:	**25** 5 + 20
Exam Duration:	**45 Minutes**
Time Taken:	**45 Minutes**

EXAM RESPONSE | EXAM STATS | FEEDBACK

Technical

Q #1 | Multiple Choice Type | Award: 1 | Penalty: 0.33 | Digital Logic

Let A, B, C be three boolean variables. $\oplus$ and $\odot$ are exclusive-or(ExOr) and exclusive-nor(ExNor) operations respectively.

Consider the following statements :

1. $(A \oplus B) \oplus C = A \oplus (B \oplus C)$
2. $(A \odot B) \odot C = A \odot (B \odot C)$
3. $A \oplus B \oplus C = A \odot B \odot C$
4. $A \oplus B \oplus C = \overline{(A \odot B \odot C)}$

Which of the above statements is/are correct?

A. 1 and 3 only
B. 2 and 4 only
C. $1, 2$ and 3 only
D. $1, 2$ and 4 only

Your Answer: C | Correct Answer: C | Correct | Discuss

Q #2 | Numerical Type | Award: 1 | Penalty: 0 | Digital Logic

An XOR gate with 7 variables(inputs) is being developed. Number of different input combinations for which output is 1?

Your Answer: 65 **Correct Answer: 64** Incorrect Discuss

Q #3 Multiple Choice Type Award: 1 Penalty: 0.33 Digital Logic

The possible number of Boolean function of 3 variables X, Y and Z such that $f(X, Y, Z) = f\left(X', Y', Z'\right)$

A. 8
B. 16
C. 64
D. 32

Your Answer: B **Correct Answer: B** Correct Discuss

Q #4 Multiple Choice Type Award: 1 Penalty: 0.33 Digital Logic

Digit	A	B	C	D
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
	•	•	•	•
	•	•	•	•
9	1	0	0	1
Invalid Codes	1	0	1	0
	•	•	•	•
	1	1	1	1

The table in the figure above shows the binary-coded-decimal (BCD) representation of the digits 0 through 9. The Boolean expression that represents the set of invalid codes is

A. $\mathrm{A} \vee \mathrm{BC}$
B. $AB \vee CD$
C. $AB \vee AC$
D. $AB \vee AD$

Your Answer: C **Correct Answer: C** Correct Discuss

Q #5 Multiple Choice Type Award: 1 Penalty: 0.33 Digital Logic

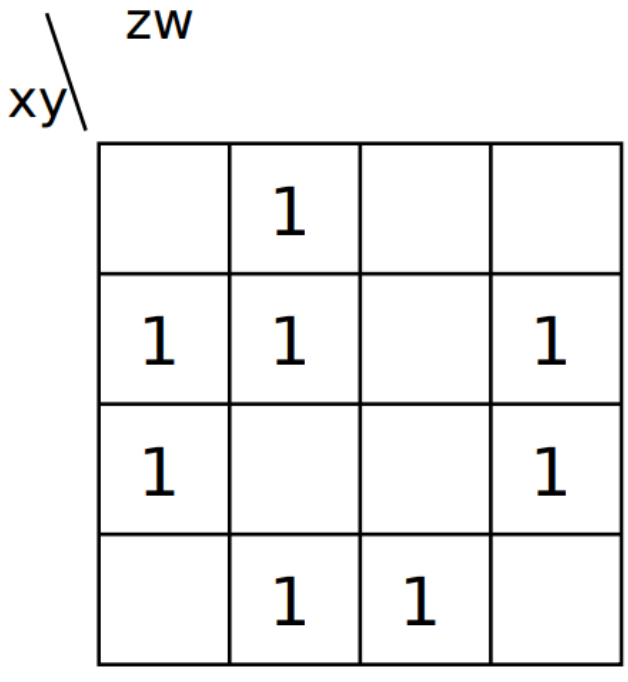
Gray code for some natural number n is $1111\ 1111$ and it is stored in an 8 -bit register R. If we store the Gray code of $n+1$ in R then what will be the content of R?

A. $0000\ 0000$
B. $1010\ 1011$
C. $1111\ 1110$
D. Cannot store gray code of $n+1$ in an 8 bit register.

Your Answer: C **Correct Answer: C** Correct Discuss

Q #6 | Multiple Select Type | Award: 2 | Penalty: 0 | Digital Logic

Consider the Karnaugh map below for a boolean function $F(x, y, z, w)$.



Which of the following is/are an implicant that's neither a prime implicant, nor a minterm of function F?

A. yw'
B. yzw'
C. $x'z'$
D. $x'yz'w$

Your Answer: B;C;D | Correct Answer: B | Incorrect | Discuss

Q #7 | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Digital Logic

Consider five seats, numbered 0 to 4, arranged in a circle and described by Boolean variables i_0 to i_4. Boolean variable i_0 is true if seat 0 is occupied and i_0 is false if the seat is not occupied (no one is sitting in the seat), likewise for i_1, i_2, i_3, and i_4.

Which of the following Boolean expressions is true iff at least two people are sitting next to each other and at least one seat is not occupied?

A. $(i_0i_1 + i_1i_2 + i_2i_3 + i_3i_4 + i_4i_0)\left(\overline{i_0i_1i_2i_3i_4}\right)$
B. $(i_0i_1 + i_1i_2 + i_2i_3 + i_3i_4 + i_4i_0)\,(i_0i_1i_2i_3i_4)$
C. $(i_0i_1 + i_1i_2 + i_2i_3 + i_3i_4 + i_4i_0)$
D. None

Your Answer: D | Correct Answer: A | Incorrect | Discuss

Q #8 | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Digital Logic

Let f be a boolean function on n boolean variables $(x_1, x_2, \ldots, x_n)$. We say a variable x_i is dummy in boolean function f if $f(x_1, \ldots, x_{i-1}, 0, x_{i+1}, \ldots, x_n) = f(x_1, \ldots, x_{i-1}, 1, x_{i+1}, \ldots, x_n)$ for all the possible values of the other variables(i.e., variables except x_i), then the variable x_i is a dummy variable in f. A variable x_k is said to be Non-dummy in function f if x_k is not a dummy variable in f.

Consider the following statements regarding the minimized expression of the function f:

1. A dummy variable is Never present (in original form or complemented form) in any minimized expression of f.
2. A dummy variable is always present (in original form or complemented form) in every minimized expression of f.

3. A dummy variable may be present (in original form or complemented form) in some minimized expression of f.
4. A Non-dummy variable is Always present (in original form or complemented form) in every minimized expression of f.
5. A Non-dummy variable may not be present (in original form or complemented form) in some minimized expression of f.

Which of the above statements is True?

A. Only 1
B. Only $2, 4$
C. Only $1, 4$
D. Only $3, 5$

Your Answer: | **Correct Answer: C** | Not Attempted | Discuss

Q #9 Numerical Type | Award: 2 | Penalty: 0 | Digital Logic

Let f be a boolean function on n boolean variables $(\mathrm{X}_1, \mathrm{X}_2, \ldots, \mathrm{X}_n)$. We say a variable $\mathbf{X}_\mathrm{i}$ is dummy in boolean function f if

$$f(\mathbf{X}_1, \ldots, \mathbf{X}_{i-1}, 0, \mathbf{X}_{i+1}, \ldots, \mathbf{X}_n) = f(\mathbf{X}_1, \ldots, \mathbf{X}_{i-1}, 1, \mathbf{X}_{i+1}, \ldots, \mathbf{X}_n)$$

for all the possible values of the other variables(i.e. variables except $\mathbf{X}_\mathrm{i}$), then the variable X_i is a dummy variable in f. i.e. a variable $\mathbf{X}_\mathrm{i}$ is called dummy if, whenever we complement the value of X_i in any row of the truth table of f, then the value of f doesn't change. Number of boolean functions on 8 variables $(x_1, x_2, \ldots, x_8)$ such that x_1, x_2, x_3, x_4 are dummy variables in those functions, is _____.

Your Answer: | **Correct Answer: 65536** | Not Attempted | Discuss

Q #10 Multiple Select Type | Award: 2 | Penalty: 0 | Digital Logic

Let $\mathrm{R1}$ and $\mathrm{R2}$ be two 4–bit registers that store numbers in 1's complement form. For the operation $\mathrm{R1} + \mathrm{R2}$, which one of the following values of $\mathrm{R1}$ and $\mathrm{R2}$ gives an arithmetic overflow?

A. $\mathrm{R1} = 1011$ and $\mathrm{R2} = 1110$
B. $\mathrm{R1} = 1100$ and $\mathrm{R2} = 1010$
C. $\mathrm{R1} = 1111$ and $\mathrm{R2} = 1000$
D. $\mathrm{R1} = 1001$ and $\mathrm{R2} = 1111$

Your Answer: B | **Correct Answer: B** | Correct | Discuss

Q #11 Multiple Choice Type | Award: 2 | Penalty: 0.67 | Digital Logic

The literal count of a Boolean expression is the sum of the number of times each literal appears in the expression. For example, the literal count of $(xy + xz' + x'y)$ is 6. Let f be some fully-specified function on n variables, $n \geq 4$.
Which of the following statement is necessarily true for f :

A. The minimised SOP (sum of product) and minimised POS (product of sum) forms have the same literal count.
B. The minimised POS form has smaller literal count than the minimised SOP form.
C. The minimised SOP form has smaller literal count than the minimised POS form.
D. None of the above.

Your Answer: A | Correct Answer: D | Incorrect | Discuss

Q #12 | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Digital Logic

Consider two 2-bit numbers $A = a_1a_0$ and $B = b_1b_0$. The value of a 2-bit number $X = x_1x_0$ is defined as: $v(X) = x_1 \times 2^1 + x_0 \times 2^0$

Assume that A and B are such that $|v(A) - v(B)| \leq 2$. A four-variable function $f(a_1, a_0, b_1, b_0)$ is to have value 1 whenever $v(A) \leq v(B)$, and value 0 otherwise.

The number of prime implicants and essential prime implicants for this function f, respectively, are

A. $5, 5$
B. $5, 4$
C. $6, 5$
D. $6, 4$

Your Answer: | Correct Answer: C | Not Attempted | Discuss

Q #13 | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Digital Logic

F is a boolean function in five boolean variables a, b, c, d and e.

$$F(a, b, c, d, e) = \sum(0, 1, 7, 8, 14, 15, 16, 17, 29, 30, 31)$$

Let D be the Dual of function F. Then which of the following is Not a subset of (true) minterms of D?

A. $3,\ 4,\ 5,\ 6,\ 27,\ 28$
B. $7,\ 8$
C. $3,\ 4,\ 5,\ 6,\ 7,\ 8$
D. $3,\ 4,\ 7,\ 8,\ 23,\ 24,\ 29$

Your Answer: D | Correct Answer: D | Correct | Discuss

Q #14 | Numerical Type | Award: 2 | Penalty: 0 | Digital Logic

How many boolean functions on 4 Variables are there whose dual is the same as their complement i.e. a function f for which $\overline{f} = f_{dual}$?

Your Answer: 256 | Correct Answer: 256 | Correct | Discuss

Q #15 | Numerical Type | Award: 2 | Penalty: 0 | Digital Logic

Consider a 4 input boolean function $\mathrm{F(X, Y, Z, T)}$. The minterm $\mathrm{X'Y'Z'T'}$ is known to be in the Canonical SOP form of F. What is the maximum number of minterms that the Canonical SOP form of F can have such that no simplification is possible (i.e. Canonical SOP form itself is the minimized SOP form)?

Your Answer: 25 | Correct Answer: 8 | Incorrect | Discuss
