Different chapter = red mark
Out of syllabus = blue mark

Chapter 3: Boolean Algebra and Simplification

- 2019-20 Midterm: Simplify the Boolean function F(w, x, y, z) = Σ(1, 3, 7, 11, 15) with don't-care conditions d(w, x, y, z) = Σ(0, 2, 5) and show "An expression with the minimum number of literals is not necessarily unique."
- 2020-21 Midterm: Simplify the Boolean function F(w, x, y, z) = Σ(1, 3, 7, 11, 15) with don't-care conditions d(w, x, y, z) = Σ(0, 2, 5) and show that an expression with the minimum number of literals is not necessarily unique.
- 2020-2021 Final: Simplify F(w, x, y, z) = Σ(1, 3, 7, 11, 15) with don't care conditions d(w, x, y, z) = Σ(0, 2, 5) and show that an expression with the minimum number of literals is not necessarily unique.
- 2020-2021 Final: Find the complement of the function F(x, y, z) = x(y' + z')z and F(x, y, z) = yz + y'z using De Morgan's theorem.
- 2020-2021 Final: Prove that Σm(0, 1, 2, 3, 4, 5, 6, 7) = ΠM(8, 9, 10, 11, 12, 13, 14, 15).
- 2020-2021 Final: Consider F(A, B, C, D) = Σ(0, 2, 3, 5, 7, 8, 9, 10, 11, 13, 15). Find out and show prime implicants and essential prime implicants by the Karnaugh map from the above expression.
- 2020-2021 Final: Simplify the following Boolean function by using the tabulation method: F = Σ(0, 1, 2, 8, 10, 11, 14, 15).

Chapter 4: Combinational Logic

- 2019-20 Midterm: What are the purposes of arithmetic circuits? Design and describe a 4-bit full adder with a look-ahead carry generator.
- 2020-2021 Final: Implement the following Boolean function using only NAND gates (a universal gate): F(A, B, C, D) = A'B'C'D + ABC'D' + A'B'CD.
- 2020-2021 Final: Realize with all NOR gates a NAND gate.
- 2020-2021 Final: Implement the following Boolean function in multilevel NAND gates: F = A(B + CD) + BC
- 2019-20 Midterm: Design a logic circuit to determine a prime number ranging from 0 to 15.

Decimal	A	B	C	D	Y (Prime?)
0	0	0	0	0	0
1	0	0	0	1	0
2	0	0	1	0	1
3	0	0	1	1	1
4	0	1	0	0	0
5	0	1	0	1	1
6	0	1	1	0	0
7	0	1	1	1	1

Decimal	A	B	C	D	Y (Prime?)
8	1	0	0	0	0
9	1	0	0	1	0
10	1	0	1	0	0
11	1	0	1	1	1
12	1	1	0	0	0
13	1	1	0	1	1
14	1	1	1	0	0
15	1	1	1	1	0

- 2020-21 Midterm: Why is code conversion needed? Design a BCD to Excess-3 converter with Boolean functions, a logic diagram, a truth table, and a proper description.
- 2020-2021 Final: A four-bit binary number is represented as A3A2A1A0, where A3, A2, A1, and A0 represent the individual bits and A0 is equal to the LSB. Design a logic circuit that will produce a HIGH output whenever the binary number is greater than 0010 and less than 1000.

Decimal	A3	A2	A1	A0	Y (Output)
0	0	0	0	0	0
1	0	0	0	1	0
2	0	0	1	0	0
3	0	0	1	1	1
4	0	1	0	0	1
5	0	1	0	1	1
6	0	1	1	0	1
7	0	1	1	1	1
8	1	0	0	0	0
9	1	0	0	1	0
10	1	0	1	0	0
11	1	0	1	1	0
12	1	1	0	0	0
13	1	1	0	1	0
14	1	1	1	0	0
15	1	1	1	1	0

- 2020-2021 Final: Define universal gate. Implement a combinational circuit which converts a four-bit excess-3 code to a four-bit BCD code.

বই এ যেটা দেয়া আছে সেটার উল্টো কাহিনী

courtesy :: ওমর ফারুক তানভির + chatGPT