VITEEE 2021 Solutions May 30 - Slot 2

Ques. Boolean Identity (A→ + B→).(A +B) is equal to

Solution.
To solve the given Boolean expression, we need to simplify it using Boolean algebra identities.

Given:
$$ (A' + B') \cdot (A + B) $$

Where:
A' is the complement (NOT) of A
B' is the complement (NOT) of B

To simplify, distribute the terms using the distributive property:
$$ = A'A + A'B + B'A + B'B $$

Let's simplify each term:

1. $A'A$ will always be 0 because it is the AND operation between a variable and its complement.
2. $B'B$ will also always be 0 for the same reason.

So the above expression reduces to:
$$ A'B + B'A $$

This is the Boolean expression for the Exclusive OR (XOR) operation:
$$ A \oplus B $$

So, the simplified Boolean expression for $(A' + B') \cdot (A + B)$ is:
$$A \oplus B$$

Ques. Max value of x+3y subject to conditions x+y≤4, 0≤x≤3 & 0≤y≤2 is?

Solution.
We are given the objective function and a set of constraints, and we need to maximize the objective function under these constraints. This is a linear programming problem.

Objective function:
$Z = x + 3y$

Subject to the constraints:
1) $x + y \leq 4$
2) $0 \leq x \leq 3$
3) $0 \leq y \leq 2$

To solve this, we will evaluate the objective function at the vertices of the feasible region determined by the constraints.

From the constraints:

1) y can be expressed as $y = 4 - x$ from $x + y = 4$.
2) x has bounds: [0, 3].
3) y has bounds: [0, 2].

Considering these constraints, the vertices of the feasible region are:
A(0,0), B(0,2), C(3,0), D(2,2), and E(3,1).

Let's evaluate the objective function Z at each of these vertices:

A(0,0): $Z = 0 + 3(0) = 0$
B(0,2): $Z = 0 + 3(2) = 6$
C(3,0): $Z = 3 + 3(0) = 3$

D(2,2): $Z = 2 + 3(2) = 8$
E(3,1): $Z = 3 + 3(1) = 6$

From the above values, the maximum value of Z occurs at point D(2,2) and is 8.

So, the maximum value of $x + 3y$ under the given constraints is 8.