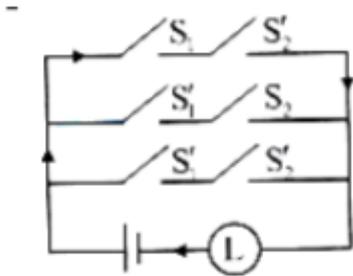


# Mathematical Induction

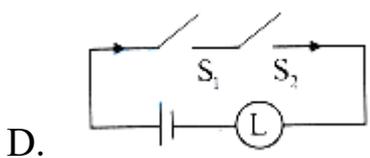
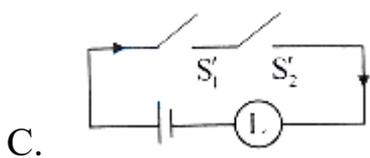
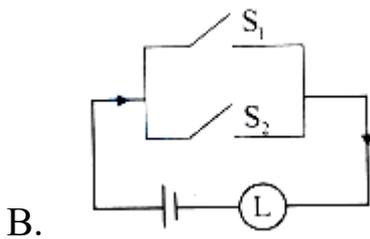
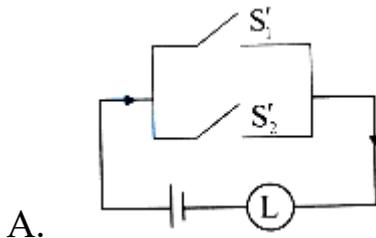
## Question1

The given following circuit is equivalent to



MHT CET 2023 (12 May Shift 2)

Options:



**Answer: A**

**Solution:**

Let  $p$  : The switch  $S_1$

$q$  : The switch  $S_2$

The symbolic form is

$$(p \wedge \sim q) \vee (\sim p \wedge q) \vee (\sim p \wedge \sim q)$$

$$\equiv (p \wedge \sim q) \vee [\sim p \wedge (q \vee \sim q)]$$

...[Distributive Law]

$$\equiv (p \wedge \sim q) \vee [\sim p \wedge t]$$

...[Complement Law]

$$\equiv (p \wedge \sim q) \vee \sim p$$

...[Identity Law]

$$\equiv \sim p \vee (p \wedge \sim q)$$

[Commutative Law]

$$\equiv (\sim p \vee p) \wedge (\sim p \vee \sim q)$$

...[Distributive Law]

$$\equiv t \wedge (\sim p \vee \sim q)$$

...[Complement Law]

$$\equiv \sim p \vee \sim q$$

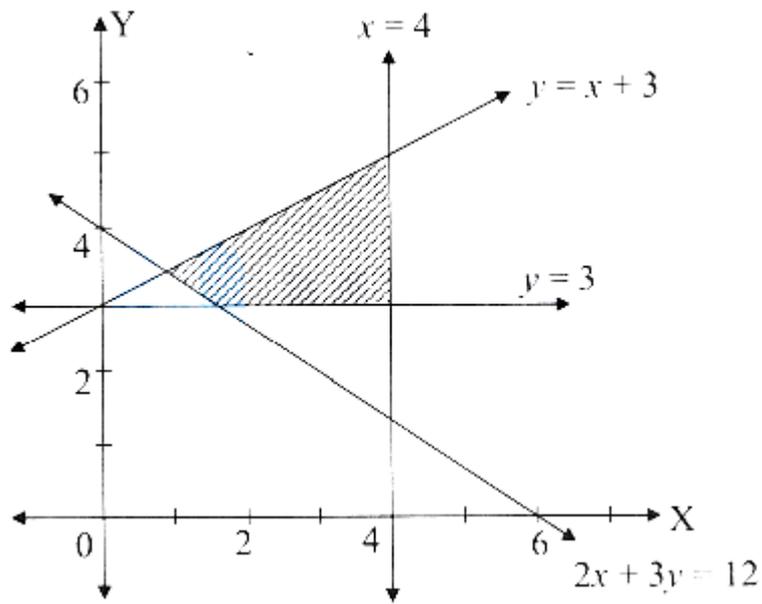
...[Identity Law]

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## Question2

The shaded area in the figure given below is a solution set of a system of inequations. The minimum value of objective function  $3x + 5y$ , subject to the linear constraints given by this system of





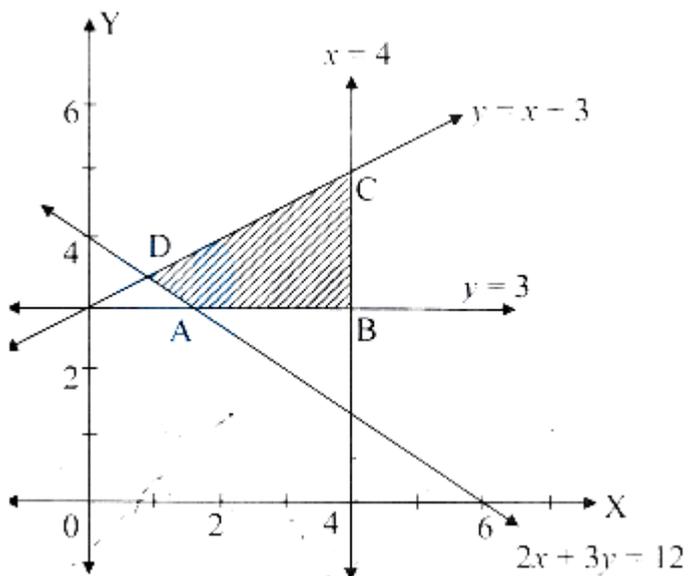
inequations is  
**MHT CET 2023 (10 May Shift 2)**

**Options:**

- A. 19.5
- B. 2
- C. 195
- D. 19.8

**Answer: A**

**Solution:**



Let the corner points of the feasible region be A, B, C, D.

Solving equations  $y = 3$  and  $2x + 3y = 12$ , we get

$$A = (1.5, 3)$$

Similarly,

$$B = (4, 3)$$

$$C = (4, 7)$$

$$D = \left(\frac{3}{5}, \frac{18}{5}\right)$$

Let  $Z = 3x + 5y$

$\therefore$  Value of  $Z$  at point  $A = 19.5$

Value of  $Z$  at point  $B = 27$

Value of  $Z$  at point  $C = 47$

Value of  $Z$  at point  $D = \frac{99}{5}$

$\therefore$  The minimum value of  $Z$  is 19.5 .

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