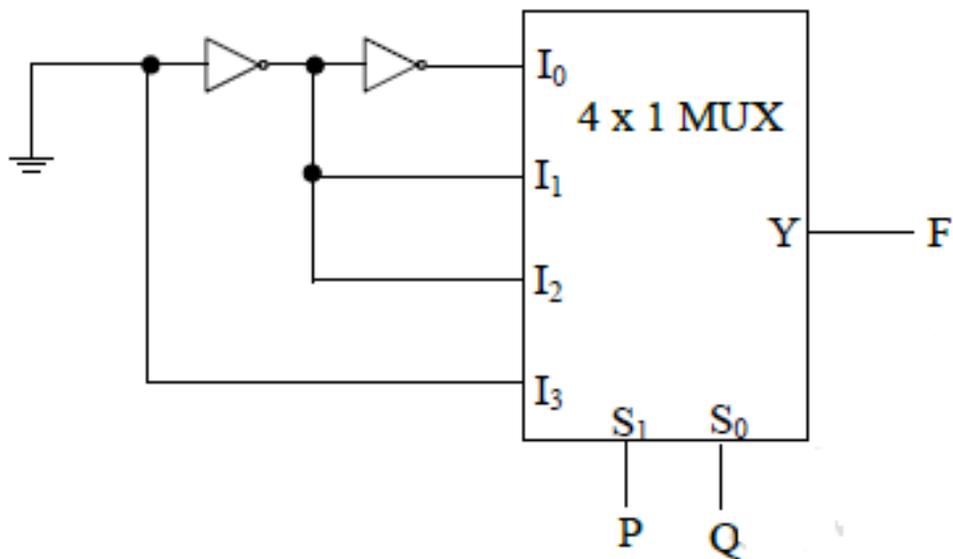


Q.1 The output of following circuit is?



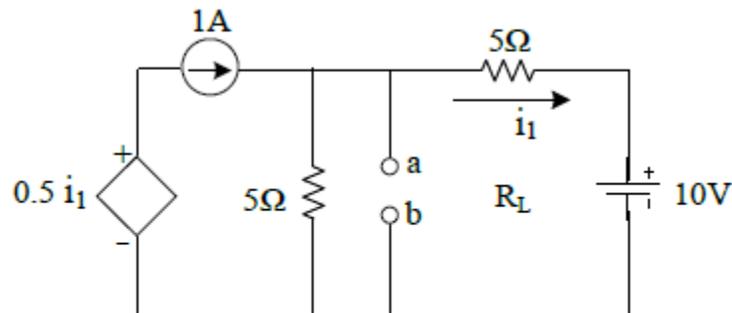
- a) AND(P,Q)
- b) OR (P,Q)
- c) XNOR (P,Q)
- d) XOR (P,Q)

Answer: Let us use the P, Q four conditions to write the truth table

P	Q	F
0	0	0
0	1	1
1	0	1
1	1	0

Therefore the output $F = \text{XOR}(P, Q)$. Option D is correct!

Q2: For the circuit shown in the following figure the Thevenin voltage and resistance seen from a, b is?



(a) 5 V and 2 Ω

(b) 7.5 V and 2.5 Ω

(c) 4 V and 2 Ω

(d) 3 V and 2.5 Ω

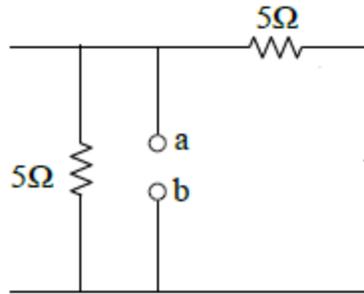
Answer: Use KCL at a, b to Find $V_{th}=V_{ab}$

$$1 = (V_{ab}-10)/5 + V_{ab}/5$$

$$2V_{ab}/5 = 3$$

$$V_{ab} = 7.5 \text{ Volts}$$

To find R_{th} , replace 1 A by Open Circuit and 10 Volts by short circuit. As 1 Amp is open circuit the $0.5i_1$ dependent source is eliminated.



Therefore $R_{th} = 5 // 5 = 2.5 \text{ Ohm}$.

The correct option is (b)

Q. 3) Find the correct expression

$$\oint_C \vec{A} \cdot d\vec{l} = \oint_C \vec{A} \cdot d\vec{s}$$

Answer: Use the Stoke's theorem and complete the expression

$$\oint_C \vec{A} \cdot d\vec{l} = \oint_S \nabla \times \vec{A} \cdot d\vec{s}$$

Q4: For static electric and magnetic fields in an in homogenous source-free medium, which of the following represents the correct form of two of Maxwell's equations?

(a) $\nabla \cdot E = 0, \nabla \times B = 0$

$$(b) \nabla \cdot \vec{E} = 0, \nabla \cdot \vec{B} = 0$$

$$(c) \nabla \times \vec{E} = 0, \nabla \times \vec{B} = 0$$

$$(d) \nabla \times \vec{E} = 0, \nabla \cdot \vec{B} = 0$$

Answer: Use the Maxwell's equations in the differential form

$$\begin{aligned} \nabla \times \vec{H} &= \vec{J} + \frac{\partial \vec{D}}{\partial t} \\ \nabla \times \vec{E} &= -\frac{\partial \vec{D}}{\partial t} \\ \nabla \cdot \vec{D} &= \rho \\ \nabla \cdot \vec{B} &= 0 \end{aligned}$$

For Static electric and magnetic field derivative term will vanish.

Therefore the correct solution is

$$\nabla \times \vec{H} = \vec{J}$$

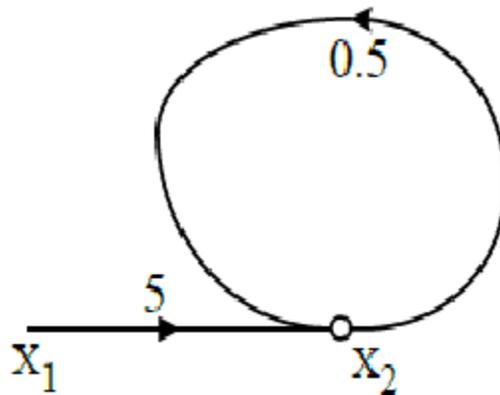
$$\nabla \times \vec{E} = 0$$

$$\nabla \cdot \vec{D} = \rho$$

$$\nabla \cdot \vec{B} = 0$$

Hence correct option is d)

Q 5. In the signal flow graph shown in figure $X_2 = TX_1$ where T, is equal to?



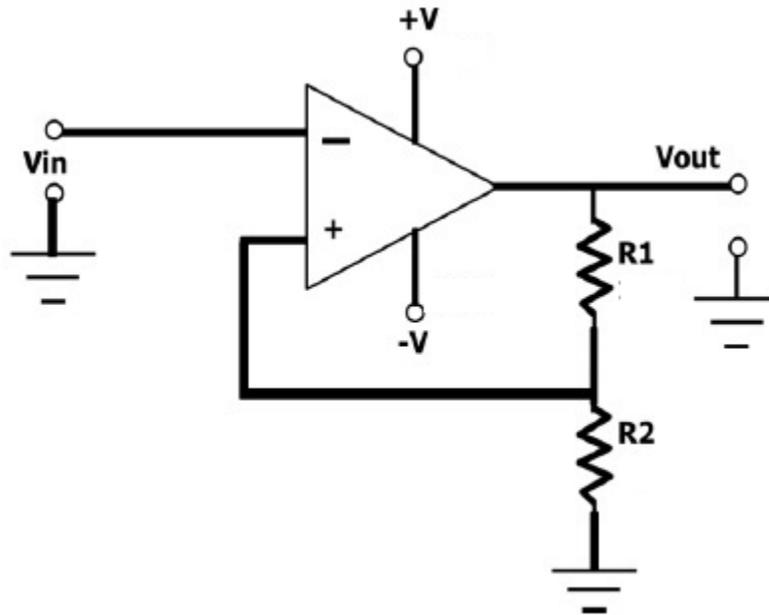
- a) 2.5
- b) 5.0
- c) 5.5
- d) 10

Answer: Use the mason's gain formula and compare $X_2 = TX_1$

$$\frac{X_2}{X_1} = \frac{5}{\Delta} = \frac{5}{1 - 0.5} = 10$$

Therefore $T = 10$. Answer d) is correct

Q.6 The circuit shown in the following figure is?



- a) Non-Inverting Amplifier
- b) Inverting Amplifier
- c) Oscillator
- d) Schmitt trigger

Answer: The circuit uses the positive feedback and output will switch to $+V_{sat}$ and $-V_{sat}$. Hence it is a Schmitt Trigger. Option d) is correct.