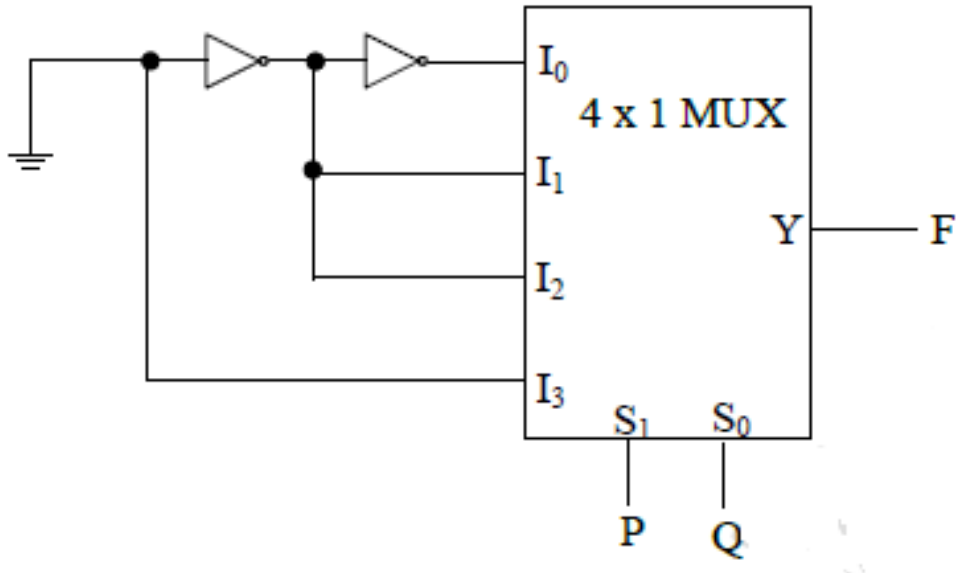
Q.1 The output of following circuit is?



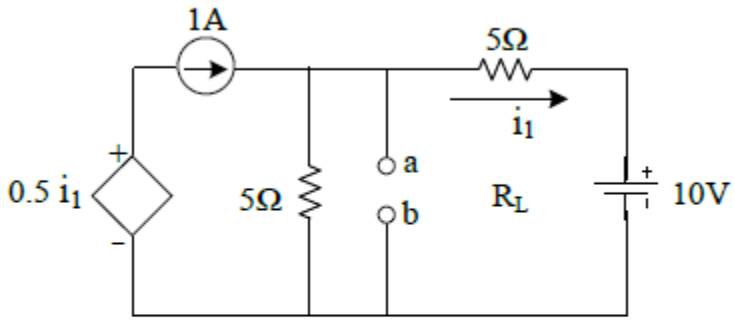
a) AND(P,Q)
b) OR (P,Q)
c) XNOR (P,Q)
d) XOR (P,Q)

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

Therefor the output F= 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

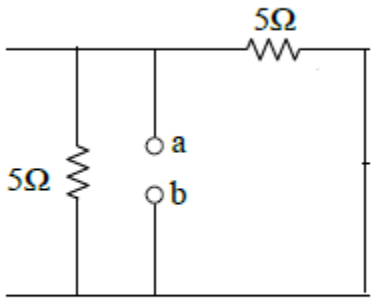
Answer: Use KCL at a, b to Find Vth=Vab

1= (Vab-10)/5 + Vab/5

2Vab/5 = 3

Vab= 7.5 Volts

To find Rth, replace 1 A by Open Circuit and 10 Volts by short circuit. As 1 Amp is open circuit the 0.5i1 dependent source is eliminated.



Therefore Rth= 5//5 = 2.5 Ohm.

The correct option is (b)

Q. 3) Find the correct expression

$$\oint_C \vec{A} \cdot \vec{dl} = \oint_C \_\_ . \vec{d}\, S$$

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

$$\oint \vec{A} \cdot \vec{dl} = \oint_S \nabla \times \vec{A} \cdot \vec{ds}$$

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) $\nabla . E = 0, \nabla \times B = 0$

(b) $\nabla . E = 0, \nabla . B = 0$

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

(d) $\nabla \times E = 0, \nabla . B = 0$

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

$$\nabla \times \vec{H} = \vec{j} + \frac{\partial \vec{D}}{\partial t}$$

$$\nabla \times E = -\frac{\partial \vec{D}}{\partial t}$$

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

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

For Static electric and magnetic field derivative term will vanish. Therefore the correct solution is

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

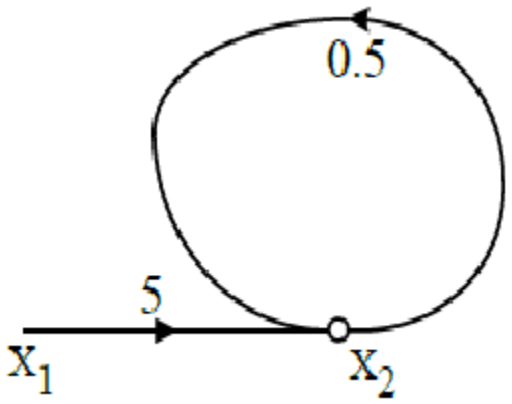
$$\nabla \times \vec{E} = 0$$

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

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

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

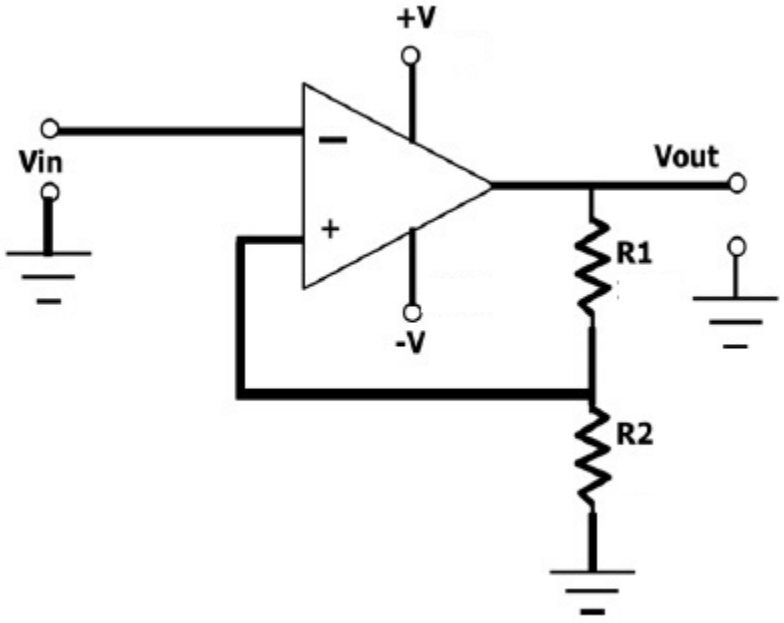
d) 10

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 +Vsat and –Vsat. Hence it is a Schmitt Trigger. Option d) is correct.