EE 101: Electrical Sciences, Tutorial-5

DEPARTMENT OF ELECTRONICS & ELECTRICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI

Name:	Roll No.:	Tutorial Group:

Q-1 Consider the logic circuit shown in Figure 1 consisting of a 2-to-4 decoder and a 4-to-1 multiplexer.

(a) Draw the Karnaugh map for the function F.

(b) Find the Boolean expression for F in the minimal SOP form.

(c) Find the Boolean expression for F in the minimal POS form.

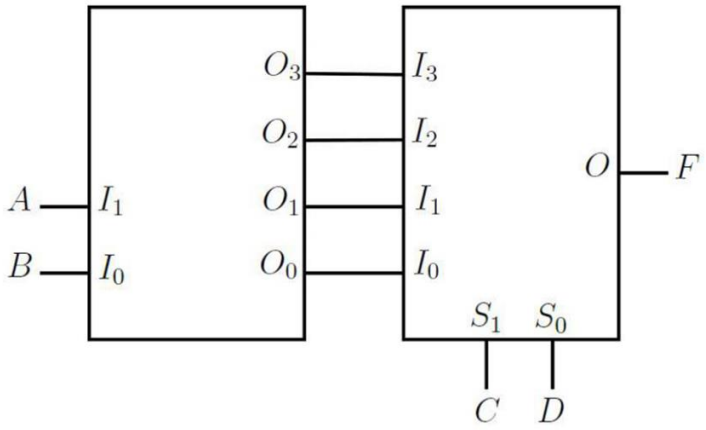

Figure 1:

Q-2.

Initially, the circuit shown in Figure 2 was at rest, which is the energy storage elements did not have any stored energy in them. If switch is closed at t=0, then find:

a. $i(0^+)$

b. $\frac{di}{dt}(0^+)$

c. $\frac{d^2i}{dt^2}(0^+)$

d. $V_L(0^+)$

e. $V_c(0^+)$

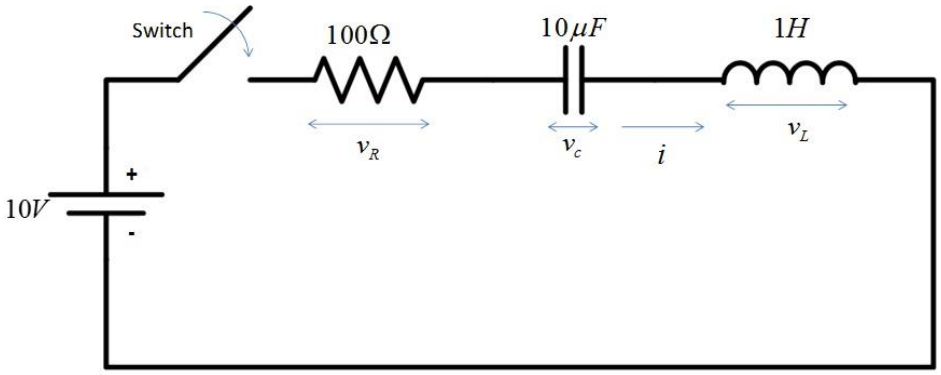

Figure 2: Figure for question 2

Q-3.

For the network shown in Figure 3, the switch has been closed for a long time. It is open at t=0. Find:

a. $i(0^+)$

b. $v(0^+)$

c. $\frac{di(0^+)}{dt}$

d. $\frac{dv(0^+)}{dt}$

e. $i(\infty)$

f. $v(\infty)$

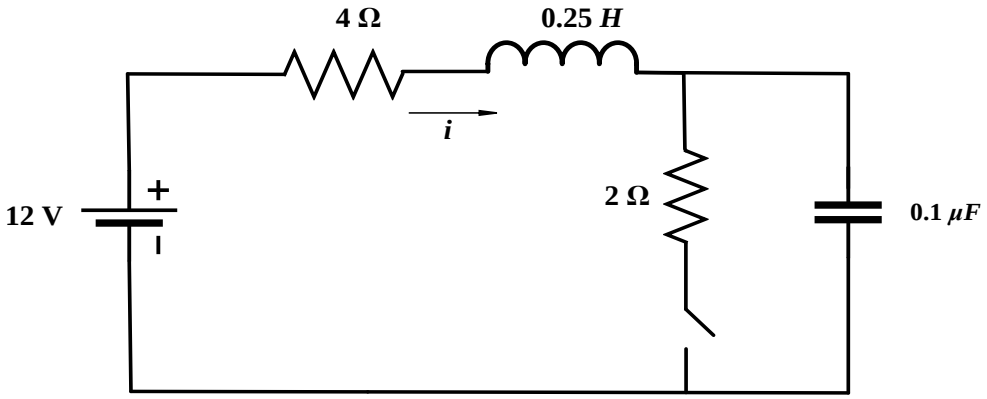

Figure 3: Figure for question 3

Q-4.

For the circuit shown in Figure 4, determine the differential equation that relates the current in the inductor, i_L, to the source voltage e. Assume e to be a time varying function.

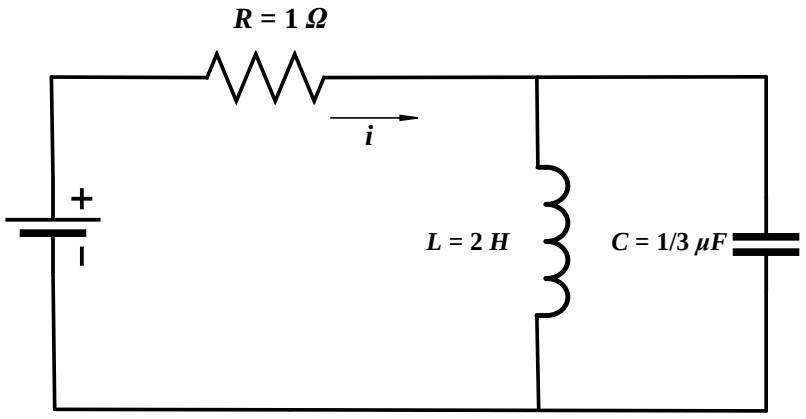

Figure 4: Figure for question 4

Use the differential operator p to determine the governing differential equation.

Q-5. Determine the rms value of the current waveform in Figure 5. If the current is passed through a 2 Ohm resistor, find the average power absorbed by the resistor.

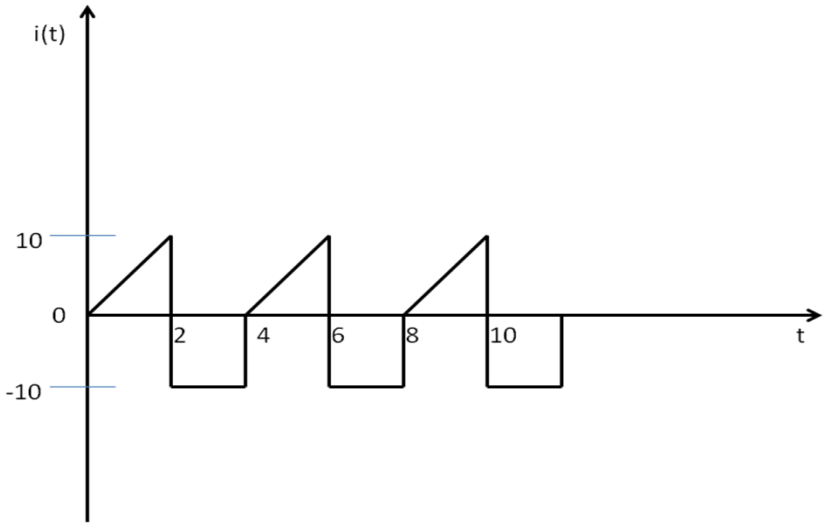

Figure 5: Figure for question 5

Q-6.

Consider the logic circuit shown below in Figure 6 consisting of logic gates, a half adder and a 4-to-1 multiplexer.

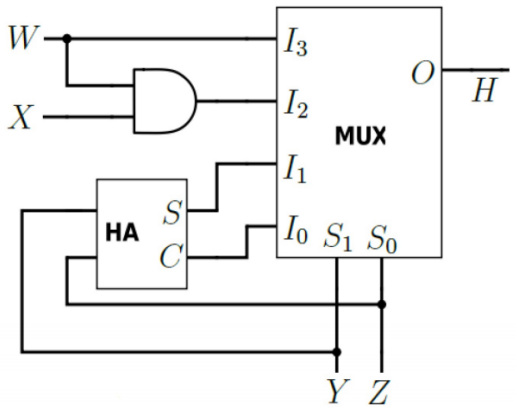

Figure 6:

(a) Find the Boolean expression for H in the minimal SOP form.

(b) Find the Boolean expression for H in the minimal POS form.

Q-7.

For the logic circuit shown in Figure 7, determine the minimized expression for the output F in terms of the input variables X and Y.

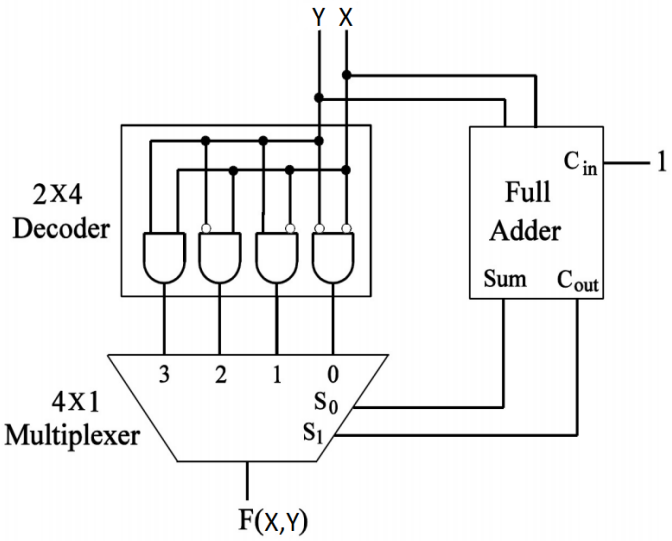

Figure7 :