

Concordia University
 Department of Mechanical and Industrial Engineering
 Industrial Electronics MECH 372/4 X Winter 2003

Midterm Exam.

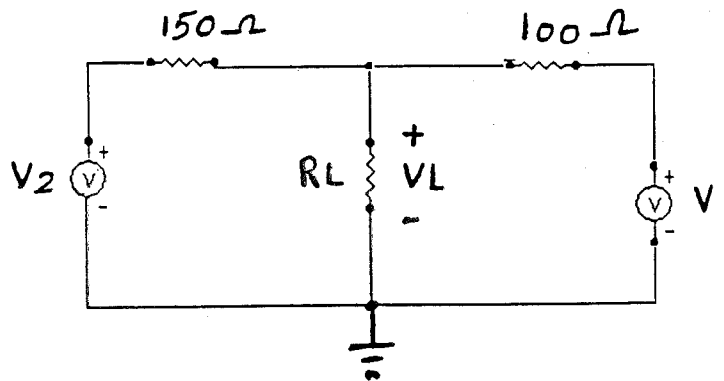
Friday, March 7, 2003
 Time: 1H15M

Student Name:	Student I.D.:
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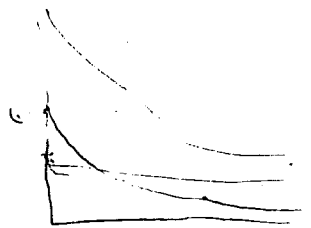
Q1)
part A (20 Marks)

For the circuit shown, use linear superposition method to answer the following questions.

- 1- If $V_1 = 8V$ and $V_2 = 10V$, what is the value of V_L ?
- 2- If $V_1 = 4V$ and $V_2 = 15V$, what is the power absorbed by R_L ?

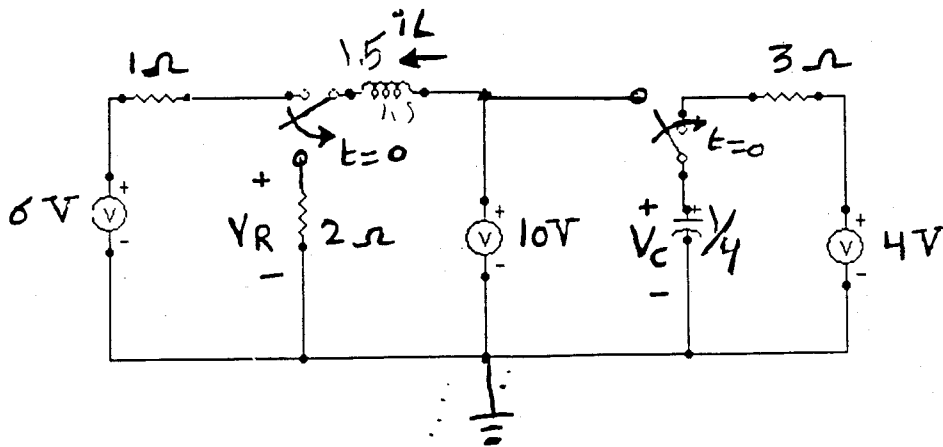


$R_L = 100 \Omega$



part B (20 Marks)

For the circuit shown, find the time (t_1) at which $V_R(t_1) = V_C(t_1)$, $t_1 > 0$.

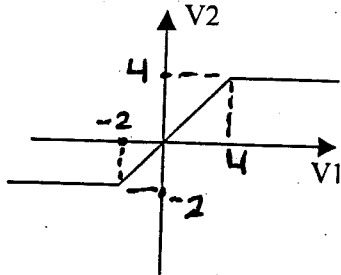


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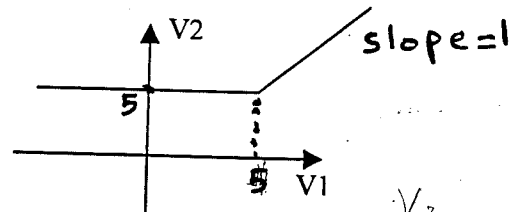
Q2)

part A (10 Marks)

Use an Ideal diode model to design a circuit for each of the following transfer functions:



(a)

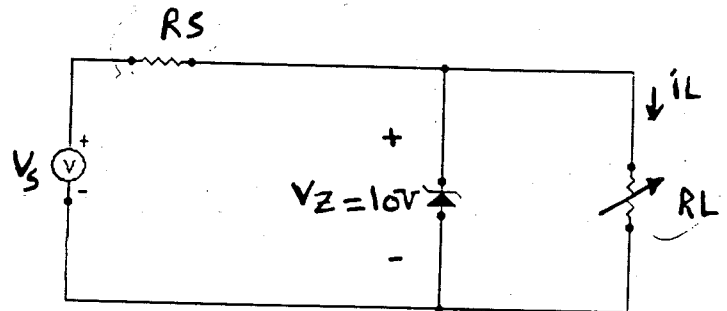


(b)

$\frac{V_2}{V_1} =$

part A (20 Marks) For the circuit shown, the unregulated voltage source changes from 15 V to 20 V and the load current changes from 20 mA to 100 mA. If $V_z = 10$ V.

- (1) What is the range of R_L ?
- (2) What are the conditions of the worst case (R_S max) such that the zener diode will remain in the breakdown region? What is the value of R_S in this case?



Q3) (30 Marks)

For the circuit shown, determine the operating point of the transistor (I_{BQ}, I_{CQ}, V_{CEQ}). What is the region of the transistor?

- $V_{CC} = 12$ V, $\beta = 130$, $R_B = 325$ $K\Omega$,
 $R_C = 1.9$ $K\Omega$, $R_E = 2.3$ $K\Omega$,
 $R_L = 10$ $K\Omega$, $R_S = 0.5$ $K\Omega$,
 $V_S = \cos(10000t)$ mV.

