



# FUNDAMENTALS OF ELECTRONICS ENGINEERING

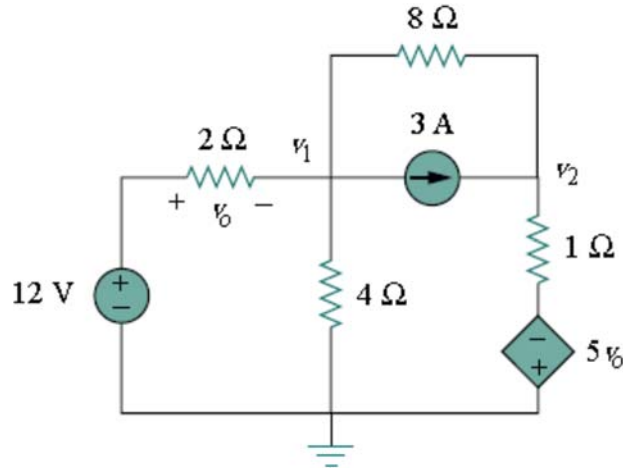
(B.Tech. 1st Year, MID Term Examination)

Max Marks: 50

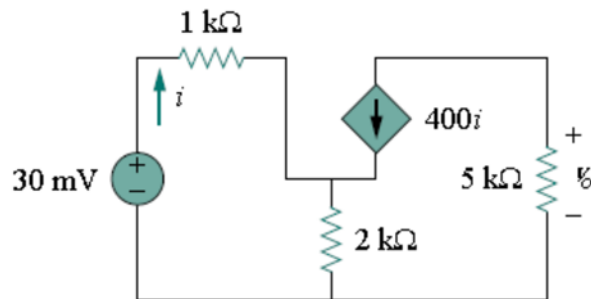
Time: 2 Hours

Attempt All Questions

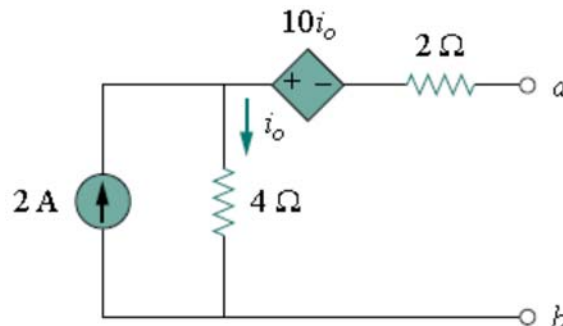
**Q1.** Use Nodal analysis to determine  $v_1$ ,  $v_2$  and  $v_o$  in the circuit below.



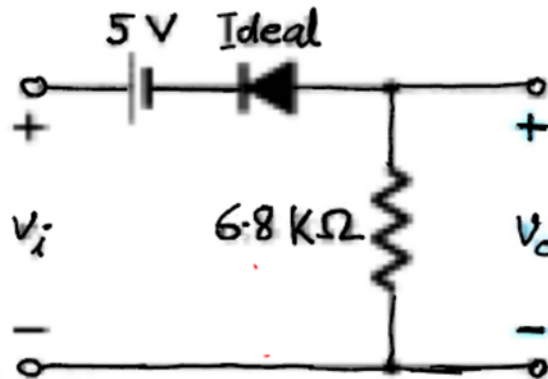
**Q2.** Using mesh analysis, calculate the voltage  $v_o$  for the simplified transistor circuit given below



**Q3.(i)** Find Norton equivalent circuit as seen from the terminal a-b for the circuit shown below.  
**(ii)** If a load resistance  $R$  is connected across terminal a-b, what should be its value so that it draws maximum power from the source?



**Q4.** Determine  $v_o$  for the diode circuits given below for a sinusoidal input  $v_i(t) = 20 \sin(\omega t)$ . Also sketch the input/output waveforms showing the conduction state of diode.



**Q5.** Design a Zener-diode based voltage regulator that will maintain an output voltage of 20 V across a  $1\text{-k}\Omega$  load with a dc input that will vary between 30 and 50 V. That is, find the value of resistor, and Zener-diode's voltage and maximum current ratings. Draw the circuit and mark it with obtained design values.