

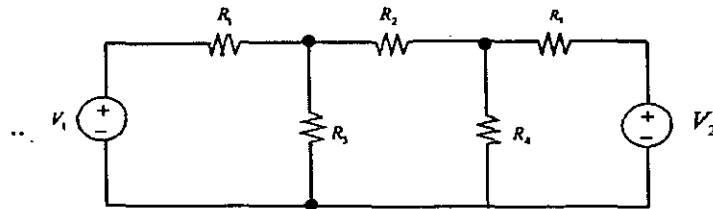


All Rights Reserved
UNIVERSITY OF GHANA
SECOND SEMESTER EXAMINATIONS, 2012/2013
LEVEL 100: BACHELOR OF SCIENCE IN ENGINEERING
FAEN 108: BASIC ELECTRONICS (3 Credits)
TIME ALLOWED: THREE HOURS (3hrs)

Index Number: _____ Signature: _____

Answer all questions in the answer booklet.
For all calculation questions, write down your final answers in the space
provided. All symbols have their usual meaning.

1. [15 marks] Find the currents flowing through all resistors in the circuit as well as the voltage drops across them.



$R_1 = 5\Omega$, $R_2 = 10\Omega$, $R_3 = 8\Omega$, $R_4 = 6\Omega$, $R_5 = 15\Omega$, $V_1 = 25V$ and $V_2 = 20V$

$I_{R1} =$

$V_{R1} =$

$I_{R2} =$

$V_{R2} =$

$I_{R3} =$

$V_{R3} =$

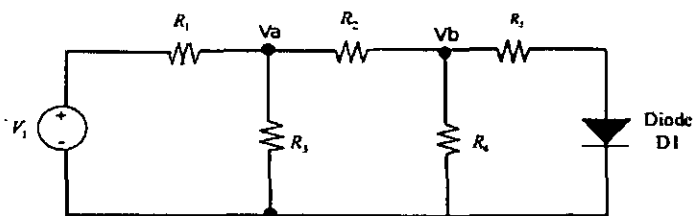
$I_{R4} =$

$V_{R4} =$

$I_{R5} =$

$V_{R5} =$

2. [10 marks] For the circuit below, calculate the voltages at the nodes. Assume that the diode is ideal with linear forward resistance $R_F = 15k\Omega$ and $V_\phi = 0.7V$



$R_1 = 3 K\Omega$, $R_2 = 10 K\Omega$, $R_3 = 6 K\Omega$, $R_4 = 9 K\Omega$, $R_5 = 15 K\Omega$ and Voltage $V_1 = 15V$

$V_a =$

$V_b =$

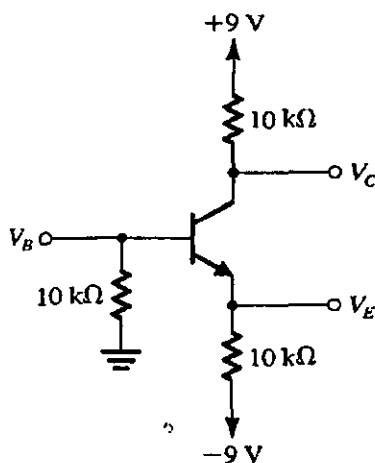
3. (a) [10 marks] A silicon junction diode has $v = 0.7V$ at $i = 1mA$. Find the voltage drop at $i = 0.1mA$ and $i = 10mA$, given a thermal voltage $V_T = 25mV$.

Hint: Saturation current, I_S is constant for a particular diode.

At $i = 0.1mA$, $v =$

At $i = 10mA$, $v =$

- (b) [5 marks] Sketch a graph showing the forward and reverse characteristics of a typical silicon diode.
- (c) [5 marks] Briefly explain any two phenomena responsible for the breakdown region of a diode
4. (a) [8 marks] Mention four (4) types of diodes and briefly state their peculiar applications
- (b) [17 marks] For the circuit shown below, measurement indicates that $V_B = -1.5V$. Assuming $V_{BE} = 0.7$, calculate V_E , α , β , V_C . If a transistor with $\beta = \infty$ is used, what values of V_B , V_C and V_E result



Index Number: _____

Signature: _____

When $V_B = -1.5V$

$V_E =$

$\alpha =$

$\beta =$

$V_C =$

If $\beta = \infty$

$V_B =$

$V_C =$

$V_E =$

