Edu 16 HESKAY

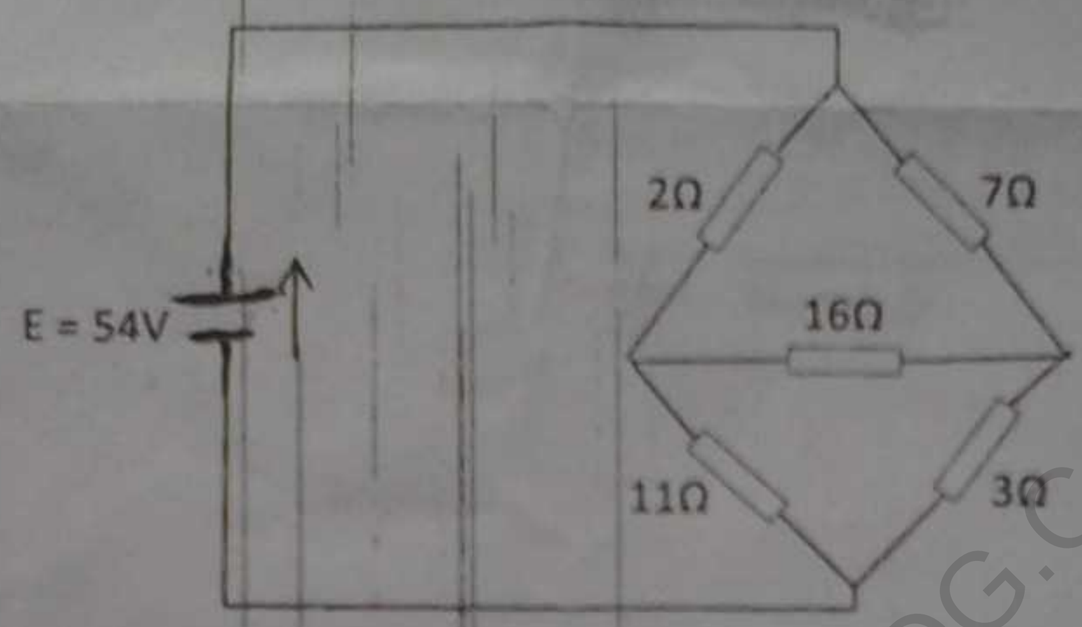
DEPARTMENT OF PHYSICS
OLABISI ONABANJO UNIVERSITY, AGO – IWOYE
2017/2018 RAIN SEMESTER EXAMINATION

PHY 202: ELECTRIC CICUITS AND ELECTRONICS **Time: 1hr, 30mins**

Instruction: Answer any three (3) questions

1a State Kirchhoff's laws

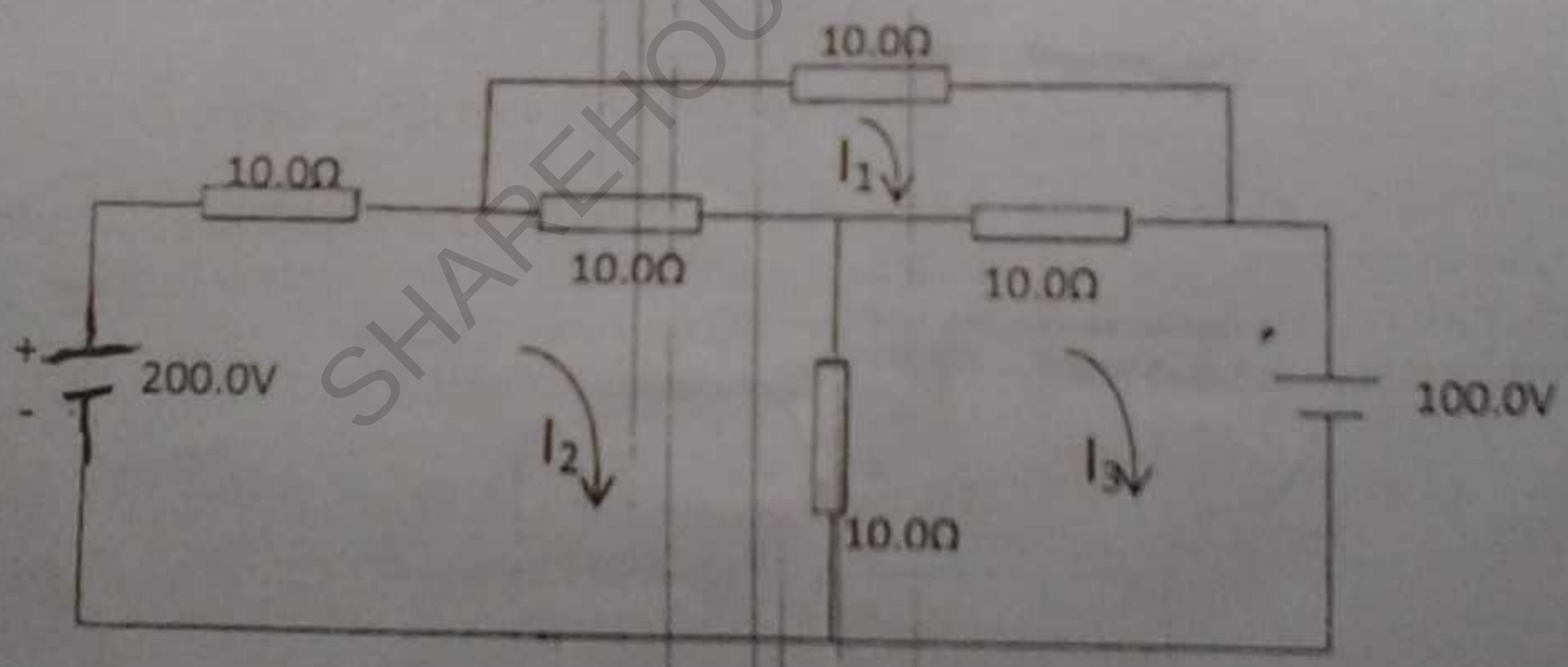
b Using Thevenin's theorem, calculate the current flowing through the 16Ω - resistor of the Wheatstone bridge network shown in the diagram below.



c (i) Find the intrinsic carrier concentration in Silicon at 300°K for which $N = 3 \times 10^{25} m^{-3}, E_g = 1.1eV, \mu_e = 0.14\ m^2/VS$ *and* $\mu_h = 0.05\ m^2/VS$.

(ii) Find the conductivity of the silicon

2a State Thevenin's theorem; and highlight the procedures of thevenizing a circuit.



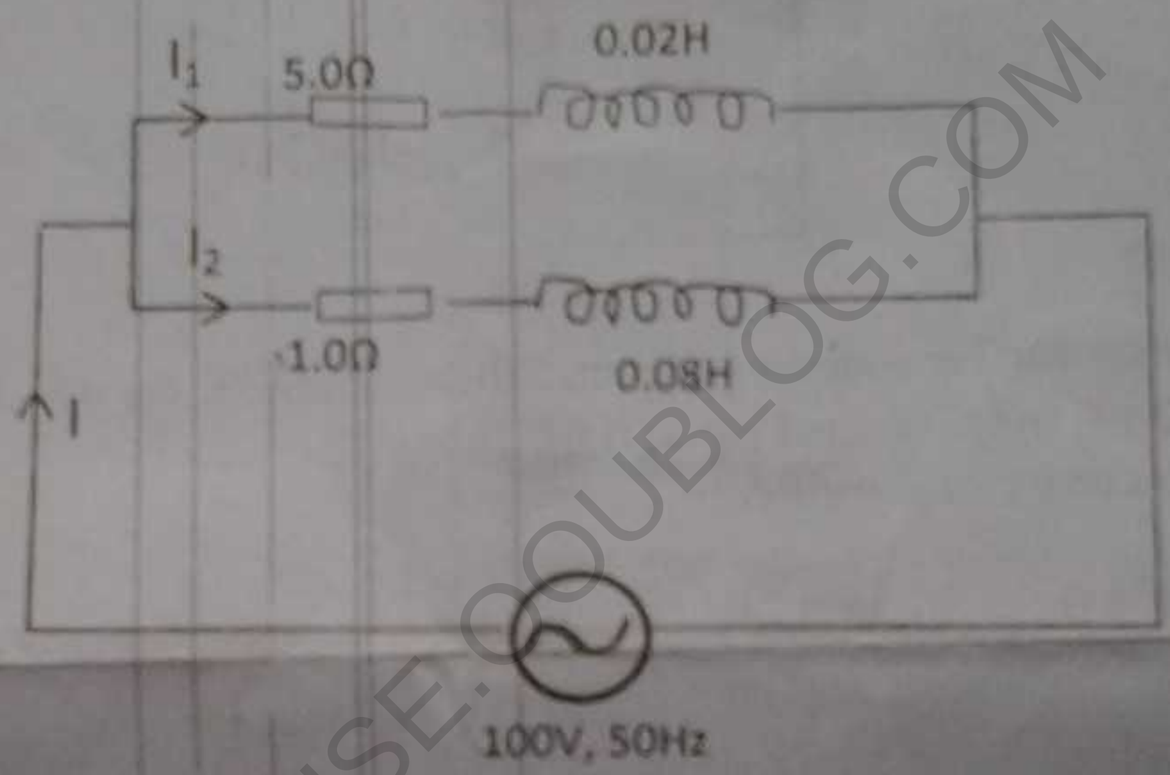
(2b) Obtain the values for the currents I_1, I_2 and I_3 in given circuit above using Resistance Matrix Method.

(2c) A bipolar transistor has a common-emitter current gain of 125. If the transistor operates with a collector current of 50mA, determine the value of base current.

3a Define the following
   i. Intrinsic Semiconductor
   ii. Doping
   iii. Barrier Voltage
   iv. Depletion Layer
   v. Biasing

b A voltage source delivers 4A when the load connected to it is 5Ω and 2A when the load becomes 20Ω. Calculate
(i) maximum power which the source can supply
(ii) power transfer efficiency of the source with R_L of 20Ω
(iii) the power transfer efficiency when the source delivers 60W.

4a A coil with a resistant of 5Ω and an inductance of 0.02H is arranged in parallel with another coil having a resistance of 1Ω and an inductance of 0.08H. Calculate the current through the combination and the power absorbed when a voltage of 100V at 50Hz is applied. Estimate the resistance of a single coil which will take the same current at the same power factor.



4b Briefly explain how N-type semiconductor can be obtained from a given element.

5A A capacitor is connected in parallel with a coil having $L = 5.52mH$ and $R = 10\Omega$ to a 100V, 50 Hz supply. Calculate the value of the capacitance for which the current taken from the supply is in phase with voltage.

5b In a tabular form, differentiate between Series and Parallel Resonant Circuits.

5C Calculate the current across the 4-Ω resistor in the figure below using any method of your choice.