



EDO UNIVERSITY, IYAMHO, EDO STATE  
FACULTY OF SCIENCE  
DEPARTMENT OF PHYSICS  
First Semester Examination, 2016/17 Session

Course Title: Electric Circuit and Electronics

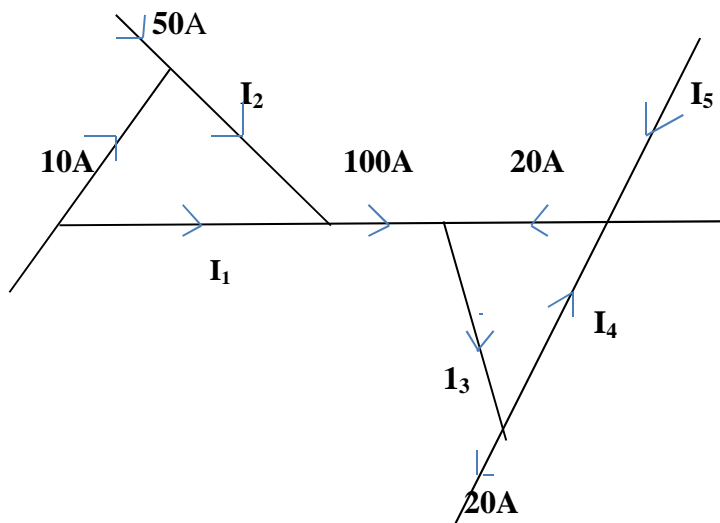
Time allowed: 3hrs Instruction: Answer question one and any other three

Course Code: PHY 213

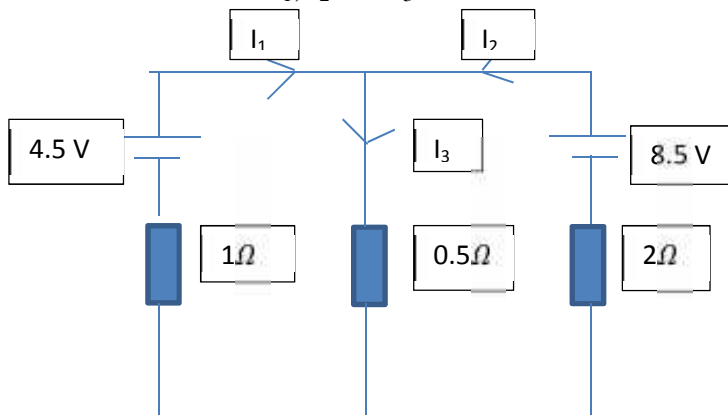
Date: 10/05/2017

**QUESTION 1**

- 1a. Define the following terms  
(i) Branches (ii) Loop (iii) Node (iv) Supernode
- 1b. State Kirchoff's laws
- 1c. Find the values of the currents.



- 1d. Find the currents  $I_1$ ,  $I_2$  and  $I_3$  in the circuit below



25 Marks

- 2a. Differentiate between a capacitor and an inductor
- 2b. Prove that, the energy stored in a capacitor is





$$w = \frac{q^2}{2C}$$

where, q is the charge, C is the capacitor and w is the energy stored by a capacitor

- 2c. A circuit consists of two capacitors P and Q in parallel, connected in series with another capacitor R. The capacitances of P, Q and R are  $4 \mu\text{F}$ ,  $12 \mu\text{F}$  and  $8 \mu\text{F}$  respectively. When the circuit is connected across a 300V d.c. supply, find (a) the total capacitance of the circuit (b) the p.d across each capacitor and (c) the charge on each capacitor

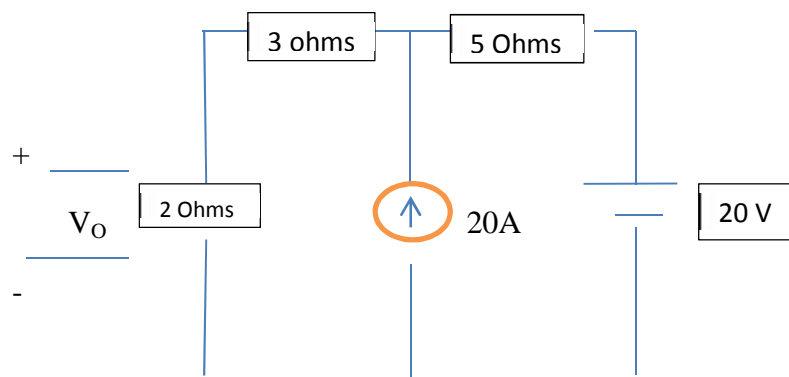
**15 Marks**

- 3a. State the following theorem

(i) Superposition theorem (ii) Norton theorem (iii) Thevenin's theorem

- 3b. Briefly explain why efficiency of a transformer is not 100%

- 3c. Using the superposition theorem, calculate  $V_O$  in the circuit



**15 Marks**

- 4a. Define Resonance and show that

$$f_r = \frac{1}{2\pi\sqrt{LC}}$$

where,  $f_r$  is the resonance frequency, L is the inductor and C is the capacitor measure in Farad.

- 4b. Differentiate between Bipolar transistors and Field Effect Transistors

- 4c. Find the current through a 5-H inductor if the voltage across it is

$$v(t) = \begin{cases} 30t^2, & t > 0 \\ 0, & t < 0 \end{cases}$$

Also, find the energy stored within  $0 < t < 5s$

**15 Marks**

- 5a. Define the term Filter

- 5b. Differentiate between Metals, Semiconductors and Insulators using Band theory





5c. A coil of inductance 80mH and negligible resistance is connected in series with a capacitance of  $0.25 \mu\text{F}$  and a resistor of resistance 12.5 across a 100V, variable frequency supply. Determine (a) the resonant frequency, and (b) the current at resonance. How many times greater than the supply voltage is the voltage across the reactance's at resonance?

**15 Marks**

6a. Briefly explain the term P-N junction

6b. Differentiate between Positive Feedback and Negative Feedback Amplifier

6c. Draw a block diagram of a differential operating amplifier

**15 Marks**

**GOOD LUCK**  
**ADEKOYA, M. A. (MNIP)**  
**Course Lecturer**

