**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**P.O. Box 972-60200 – Meru-Kenya.**

 **Tel: 020-2069349, 061-2309217. 064-30320 Cell phone: +254 712524293, +254 789151411**

**Fax: 064-30321**

**Website:** [**www.mucst.ac.ke**](http://www.mucst.ac.ke) **Email:** **info@mucst.ac.ke**

**University Examinations 2014/2015**

SECOND YEAR, SECOND SEMESTER EXAMINATION FOR DIPLOMA IN ELECTRICAL ENGINEERING

**EEE 0229: ELECTRICAL ENGINEERING PRINCIPLES IV**

**DATE: DECEMBER 2014 TIME: 1**$\frac{1}{2}$ **HOURS**

**INSTRUCTIONS:** *Answer questions* ***on****e**and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. With the aid of a phasor diagram explain the essential features in the representation of an unsymmetrical three phase system of current 1R,1Y and 1B by symmetrical components (3 marks)
2. Define the term transients (1 mark)
3. Define the term time constant of a circuit as applied to transients (1 mark)
4. In a 3 phase, 4 wire system, the currents in the R,Y and B lines under abnormal conditions were as follows:

1R=0+j50A

1Y=60-j85A

1B=-95-j5A

Determine:

1. The positive sequence components of currents (5 marks)
2. The negative sequence components of current (5 marks)
3. The zero sequence components of current ( 3 marks)
4. The return current in the neutral conductor (2 marks)
5. The voltage V=250 sin (314t+150) is suddenly applied at t=0 to a circuit consisting of a 10Ω resistor in series with a 0.1H inductor.

 (i) Deduce an equation showing how the current varies with time (7 marks)

(ii)Calculate the value of current 0.025 seconds after switching on (3 marks)

**QUESTION TWO (15 MARKS)**

1. State three conditions necessary for the production of transients currents (3 marks)
2. A 20 $μf$ capacitor is connected in series with a 90 kΩ resistor and the circuit is connected to a 40v d.c supply. Determine
3. The initial value of current flowing (1 mark)
4. The time constant of the circuit (1 mark)
5. The value of the current one second after connection (2 marks)
6. the value of the capacitor voltage two seconds after connection (3 marks)
7. The time after connection when the resistor voltage is 22V (3 marks)
8. The charge across the capacitor two seconds after connection (2 marks)

**QUESTION THREE (15 MARKS)**

1. Explain briefly five types of transients (5 marks)
2. A coil of inductance 0.02H and resistance 10Ω is connected to a 40v d.c supply. Determine
3. The final value of current (2 marks)
4. The time constant of the circuit (2 marks)
5. The value of current after a time equal to the time constant from the instant the supply voltage is connected (3 marks)
6. The expected time for the current to rise to within 5% of its final value

(3 marks)

**QUESTION FOUR (15 MARKS)**

Given that vo=12<1020, v1=7.5<-450, v2=3<1000. Find the phase voltages taking red as the reference (15 marks)