MACHAKOS UNIVERSITY

University Examinations for 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND YEAR FIRST SEMESTER EXAMINATION FOR DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

EED 212: ELECTRICAL PRINCIPLES IV

DATE: 6/6/2017 **TIME: 2:00 – 4:00 PM**

INSTRUCTIONS

Attempt Question One and Any Other Two Questions

1. (a) Describe THREE types of transients. (6 marks)

(b) A fully discharged 10μF capacitor and a 1MΩ resistor in series are connected across a constant voltage V. Determine the time taken for the capacitor to receive 95% if its final charge. (7 marks)

(c) A coil having a resistance of 6 ohms and a n inductance of 2H is switched across a 24V dc supply, calculate the;

(i) time constant

(ii) final value of the current

(iii) value of the current 1.5 seconds after the switch is closed. (7 marks)

(d) A series combination having resistance of 2MΩ and a capacitor of 0.01μF is connected across a d.c source of 50V. determine;

(i) Capacitor voltage

(ii) Charging current

After 0.02 seconds and 0.04seconds (10 marks)

2. (a) Define the following terms with respect to dc transients;

(i) Steady state value

(ii) Transient value

(iii)Time constant (6 marks)

(b) With an aid of a circuit diagram explain an experiment to illustrate variation of current with time for an RL circuit. (6 marks)

(c) A coil has a time constant of 1second and an inductance of 8H. If the coil is connected to a 100 V d.c source, determine the;

(i) Rate of rise of current at the instant of switching

(ii) Steady value of current

(iii)Time taken by the current to reach 75% of the steady value (8 marks)

3. (a) An inductor in series with a resistor is connected across a d.c supply.

(i) Sketch a graph of current against time
(ii) Explain the behavior of current (8 marks)

(b) A circuit having a resistance of 20 Ω and an inductance of 0.5H is switched across a d.c supply of 200V. Find the;

(i) equation of current as a function of time
(ii) time constant of the circuit
(iii) current at a time equal to time constant
(iv) current after 0.05 seconds
(v) rate of increase of the current at switch ON
(vi) energy stored in the coil when the current is2A. (12 marks)

4. (a) (i) Draw a circuit diagram for an experiment to illustrate variation of voltage and current against time when capacitor is charging and discharging.

(ii) Draw labeled graphs for current and voltage against time for charging and discharging a capacitor.

(iii) Explain the behavior of current during capacitor charging. (14 marks)

(b) If the current through a coil having an inductance of 0.6H is reduced from 5A to 3A in 0.05 seconds, calculate the value of induced emf in the coil. (6 marks)

5. (a) A constant voltage is applied to a series R-L circuit at t=0 by closing a switch. The voltage across L is 25V at t=0and drops to5V at t=0.025 seconds. If L=2H, determine the value of R. (7 marks)

(b) A coil of 350 turns wound on a core of non-magnetic material has an inductance of 10mH. Calculate;

(i) the flux produced by a current of 5A;

(ii) the average value of emf induced when a current of 6A is reversed in 10 mS (6 marks)

(c) A relay coil of resistance 300Ω and inductance of 8 H is connected in series with a10 Ω resistor across a d.c voltage of 60 V. If the relay operates when the current in the coil is 31.6mA, calculate the time it takes for the relay to operate from the time of switch ON of the supply. (7 marks)