



MURANG'A UNIVERSITY COLLEGE

(A Constituent College of Jomo Kenyatta University of Agriculture and Technology)

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

UNIVERSITY ORDINARY EXAMINATIONS

2015/2016

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

UNIT CODE: SEE 1206

UNIT TITLE: CIRCUIT ANALYSIS

TIME: 8.00-10.00Am

DATE: 25th –4-2016

Instructions to candidates

This paper contains four (4) questions

Question 1 is compulsory and Any Other Two questions.

You should have the following for this examination;

- Scientific calculator
- Drawing Instruments

NB: mobile phones not allowed in the examination room

1. (a) Define the following terms:
- i. Unidirectional waveform
 - ii. Alternating waveform
 - iii. Period, T.
 - iv. Frequency
 - v. Amplitude
 - vi. Instantaneous value
 - vii. Peak-to-peak value **(7marks)**
- (b) An alternating current completes 5 cycles in 8ms. Determine its frequency? **(3marks)**
- (c) An alternating voltage is given by $V = 75\sin(200\pi t - 0.25)$ volts. Find:
- (i) The periodic time, T
 - (ii) The peak-to-peak value
 - (iii) The r.m.s value
 - (iv) The phase angle in degrees and minutes relative to $75\sin 200\pi t$. **(10marks)**
- (d) The current in a.c circuit at any time t seconds is given by
 $i = 120\sin(100\pi t + 0.36)$ amperes
 Find:
- i. The peak value, the periodic time, the frequency and phase angle relative to $120\sin 100\pi t$. **(10marks)**
2. (a) Determine the capacitive reactance of a capacitor of $10\mu\text{F}$ when connected to a circuit of frequency 20 kHz. **(2marks)**
- (b) A coil of inductance 159.2mH and resistance 20Ω is connected in series with a 60Ω resistor to a 240V , 50Hz supply. Determine:
- i. The impedance of the circuit
 - ii. The current in the circuit
 - iii. The circuit phase current
 - iv. The potential difference across the 60Ω resistor **(12marks)**
- (c) Three loads each of resistance 30 ohms, are connected in star across a 415V , 50HZ supply. Calculate:
- (i) Phase voltage
 - (ii) Phase current **(6marks)**

3. (a) Define the term Q – factor. (2marks)
- (b) A capacitor C is connected in series with a 40Ω resistor across a supply voltage of frequency 60Hz. A current of 3 A flows and the circuit impedance is 50Ω . Calculate:
- (i) The value of the capacitance, C.
 - (ii) The supply voltage
 - (iii) The phase angle between the supply voltage and current
 - (iv) The potential difference across the resistor
 - (v) The potential difference across the capacitor
 - (vi) Draw the phasor diagram (18 marks)
4. (a). A 5KVA single phase transformer has turns ratio of 10:1 and is fed from a 2.5KV supply. Neglecting losses, determine ;
- (i) **The** full load secondary current
 - (ii) Minimum load current which can be connected across the secondary winding to give full load KVA
 - (iii) The primary current at full load KVA. (12marks)
- (b) Describe the construction and principle of operation of a transformer with an aid of a diagram. (8marks)