TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

UNIVERSITY EXAMINATION

DIPLOMA IN TECHNOLOGY IN ELECTRICAL AND ELECTRONICS ENGINEERING

EEP 2105: CIRCUIT THEORY II

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2019

TIME: 2 HOURS

DATE: Pick DateSelect MonthPick Year

Instructions to Candidates
You should have the following for this examination
-Answer Booklet, examination pass and student ID
This paper consists of FIVE questions. Answer any THREE questions.
Each question carries 20 marks.
Do not write on the question paper.

QUESTION 1

(a) Describe the term Phasor **(2marks)**

(b) Describe the following parameters of a.c power: Active power, Reactive power and apparent power. For each parameter, state the symbol and unit of measurements hence with the help of appropriate formula and power triangle, show how the related. **(8 marks)**

(c) For Fig. Q.1, given that $E = 50 \angle 0^\circ \; V$
   i.   Find the total impedance Z_T
   ii.   Determine the branch currents I_1, I_2 and I_3
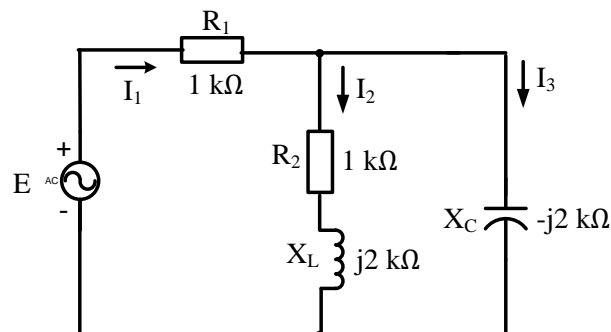   iii.   Determine the power dissipated by each of branch of the circuit.

Fig. Q1. **(10 marks)**

QUESTION 2

(a) With the help of suitable diagram and expressions, describe Millman's theorem. **(6 marks)**

(b) Describe briefly the method of source transformation in circuit analysis. **(4 marks)**

(c) Using source transform concept, determine current through 10 ohms resistor in Fig. Q.2. **(10 marks)**
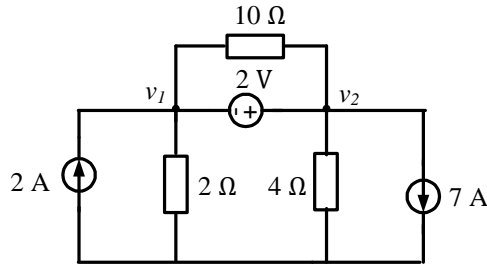

Fig. Q2

QUESTION 3

(a) Describe with appropriate diagrams the principle of generation of 3-Phase a.c voltage **(6 marks)**

(b) state the relationship between line voltage and phase voltage, line current and phase current for (i) Delta connection (ii) Star connection **(4 marks)**

(c) Each phase of a delta-connected load comprises a resistance of 40 Ω and a 40 µF capacitor in series. Determine, when connected to a 415 V, 50 Hz, 3-phase supply:
(i) the phase current (ii) line current (iii) total power dissipated **(10 marks)**

QUESTION 4

(a) An alternating current is represented by $i = 1414\sin\left(377t + \frac{\pi}{3}\right)$ mA. Determine its:
   i. RMS value
   ii. period

   (6 marks)

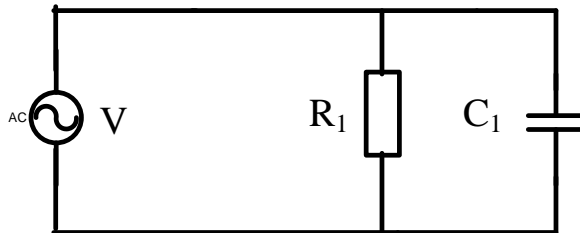(b) Draw a well labeled phasor diagram of Fig. Q 4 where V is sinusoidal voltage.

Fig. Q4

   (4 marks)

(c) A two element series circuit carries a current $i = 2.43\sin(314t)$ when connected to a voltage source $v = 100\sin(314t - 76^o)$. Determine:
   i. The circuit elements type
   ii. Circuit elements values

   (10 marks)

QUESTION 5

(a) Derive the expression for resonant frequency for an RLC series circuit. **(4 marks)**

(b) Describe with the help of suitable diagram, ONE application of RLC resonance circuits. **(2 marks)**

(c) An RLC series circuit with R = 10 Ω, L = 100 mH and C = 2 µF is connected to 50 Volts variable frequency power supply. Determine
i.   Resonant frequency
ii.   Current at resonance
iii.   Q-factor
iv.   Cut-off frequencies
v.   The circuit band Width

(14 marks)