MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2018/2019 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER

SCHOOL OF SCIENCE
UNIVERSITY EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE AND BACHELOR OF EDUCATION SCIENCE

COURSE CODE: PHY 2213
COURSE TITLE: ELECTRICAL CIRCUITS

DATE: 16TH APRIL, 2019 **TIME: __0830-1030 HRS**

INSTRUCTIONS

- Answer Question **ONE** and any other **TWO**.
- Use of sketch diagrams where necessary and brief illustrations are encouraged.
- Read the instructions on the answer booklet keenly and adhere to them.

This paper consists of __4__ printed pages.

QUESTION ONE: **[30]**

a) State three advantages of connecting loads in parallel to series in electrical circuits. [3]

b) Explain the term 'network' as used in electrical circuits. [2]

c) Find the instantaneous circuit current if a voltage $v = 100\sin(1000t)$ V is applied to:

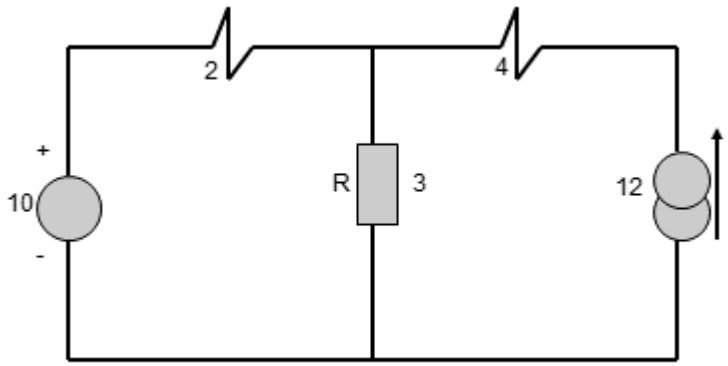
(i) a pure resistive circuit of R=50 Ω [2]

(ii) a pure inductive circuit of L=0.02 H [3]

(iii) a pure capacitive circuit of C=10 μF [3]

d) By Superposition Principle find P_R in figure 1. [3]

Figure 1



e) Explain the difference between active and passive power. [4]

f) Find the current phasor if a 60 Hz $220\angle 30^{o}$ V ac voltage is applied to

(i) a pure resistive circuit of R=10 Ω [2]

(ii) a pure inductive circuit of L=0.2 H [2]

(iii) a pure capacitive circuit of C=10 μF [2]

g) State the following theorems:

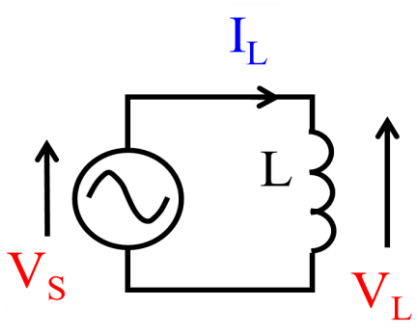
(i) Norton's theorem states [2]

(ii) Thevenin's theorem [2]

QUESTION TWO: ***[20]***

a) Show that for the circuit shown on fig.2 , Current lags voltage by 90° [4]

Figure 2



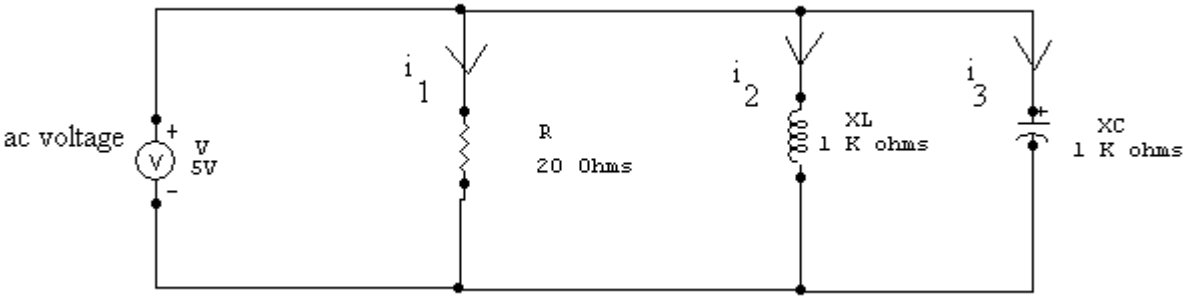
b) Refer to the circuit of Fig 3, find:

(i) the total impedance, Z_T [7]

(ii) the supply current, I_T [3]

(iii) the branch currents, I_1, I_2 and I_3. [6]

Figure 3



QUESTION THREE: ***[20 marks]***

a) Explain the following

(i) Capacitive reactance [2]

(ii) Inductive reactance [2]

(iii) Impedance [2]

(iv) Phasor [2]

b) An rms voltage of 10.0 V with a frequency of 1.00 kHz is applied to a 0.395-mF capacitor.

(i) What is the rms current in this circuit? [3]

(ii) By what factor does the current change if the frequency of the voltage is doubled? [1]

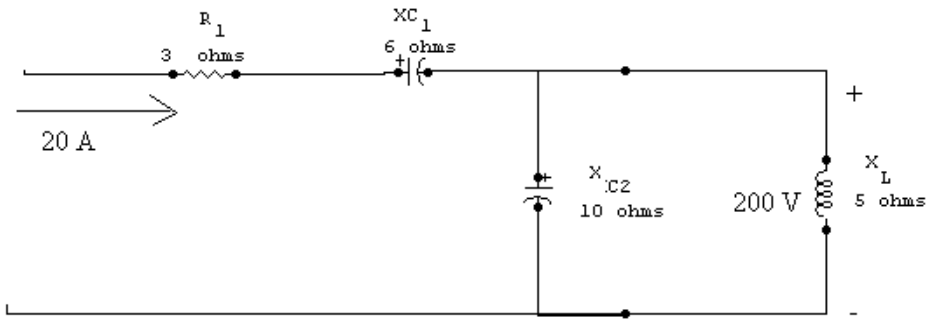
(iii) Calculate the current for a frequency of 2.00 kHz. [1]

c) For the circuit in fig.4

(i) Compute P_T and Q_T for the following circuit. [5]

(ii) Reduce the circuit to its simplest form [2]

Figure 4



QUESTION FOUR: [20 marks]

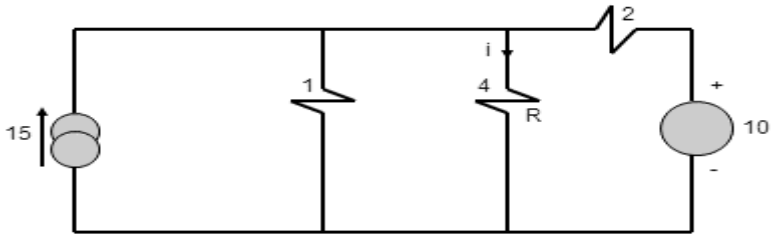
a) Explain the steps involved in applying the Mesh Analysis in solving electric circuits [5]

b) Use Mesh Analysis in fig 5 to find:

(i) The current i through resistor R. [7]

(ii) Power through resistor R. [3]

Figure 5



d) Explain the procedure for the application of the Millman's Theorem [5]

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