TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MEDICAL ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN MEDICAL ENGINEERING

SECOND YEAR SEMESTER ONE

EEE 4232: CIRCUIT AND NETWORK ANALYSIS

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEP 2017

TIME: 2 HOURS

DATE: SEP 2018

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Question **ONE** is **COMPULSORY**. Attempt any other two questions.

Do not write on the question paper.

Question ONE (COMPULSORY)

a) i) State Thevenin's theorem.

ii) Fig Q1(a) represents a resistive network. Use Thevenin's theorem determine the:

I. Current I along the 4Ω resistor

II. The power dissipated on the 4Ω resistor (10mks)

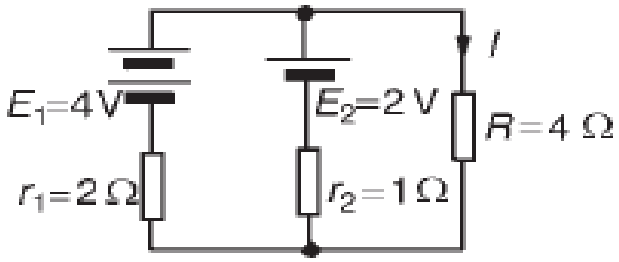

Fig Q1(a).

b) In the network of Fig Q1(b), use nodal analysis theorem to determine the voltage V_{xy} .

(12mks)

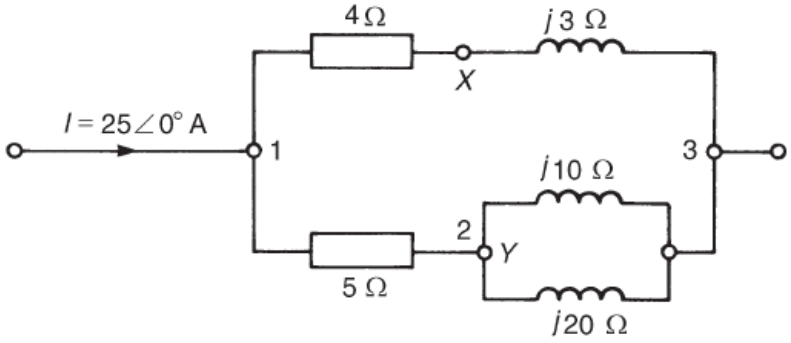

Fig Q1(b)

c) With an aid of waveforms show that the mean value of a symmetrical alternating quantity is given by:

$$V_{mean} = \frac{2\,V_{max}}{\pi}$$ (8mks)

Question TWO

a) With an aid of a current, voltage and power wave forms show that the mean power in a purely resistive network is given by:

Mean power = $\frac{V_{max}\,I_{max}}{2}$ (10mks)

b) A coil of inductance 159.2mH and resistance 40Ω is connected in parallel with a

30μ capacitor across a 240V, 50HZ supply. Determine the:

(i) Current in the coil and its phase angle
(ii) Current in the capacitor and its phase angle
(iii) Supply current and its phase angle
(iv) Circuit impedance (10mks)

Question THREE

a) (i) State Kirchoff's current and voltage laws.
(ii) Determine using Kirchoff's laws each branch current for the network shown in Fig Q3(a) (8mks)

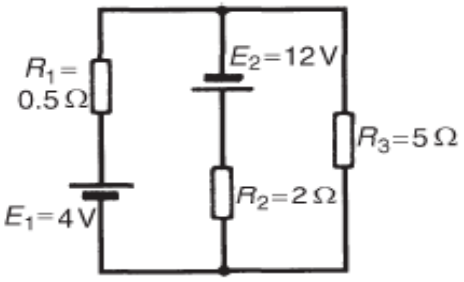

Fig Q3(a)

b) In the network of Fig Q3(b), use Delta-star transformation to determine:
(i) The current flowing in the (0 +j10)Ω impedance
(ii) The power dissipated on (20 +j0)Ω impedance (12mks)

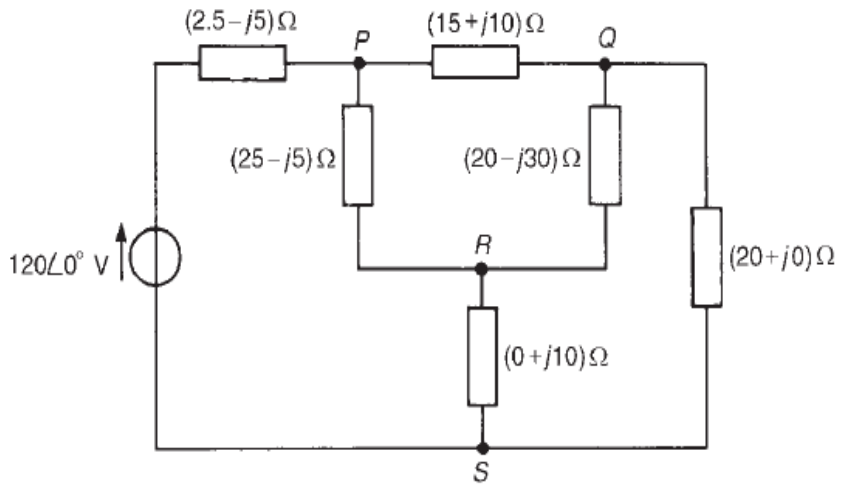

Fig Q3(b)

Question FOUR

a) Design a T-section Band pass filter to pass all frequencies between 300HZ and 1KHZ.

The load impedance is 600Ω. Draw the filter network. (8mks)

b) With an aid of T-section low pass filter network, show that the cut-off frequency

$f_c = \frac{1}{\pi\sqrt{LC}}$ (12mks)

Question FIVE

a) The current in A.C circuit at any given time t seconds is given by:

I = 75 sin(200πt - 0.25) Amperes. Determine:

(i) Peak value
(ii) Mean value
(iii) Rms value
(iv) Periodic time
(v) Frequency and phase angle (10mks)

b) A coil of negligible resistance and inductance of 100mH is connected in series with a capacitance of 2μF and a resistance of 10Ω across a 50V variable frequency supply. Determine the;

(i) Resonant frequency
(ii) Current at resonant
(iii) Voltage across the coil at resonance
(iv) Q-factor of the circuit (10mks)