# 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

END OF SEMESTER EXAMINATION

**SERIES: DEC 2016**

**TIME:** 2HOURS

**DATE: 15th** DEC 2016

**Instructions to Candidates**

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

This paper consists of **FIVE** questions. Attempt any three questions, all questions carry equal marks.

**Do not write on the question paper.**

**Question ONE**

a) i) State Kirchoff's current and voltage laws.

ii) Fig 1(a) represents a resistive network. Use kirchoff's laws to determine the:

I. Current flowing in each branch.
II. Power dissipated in 3Ω resistor. (12mks)

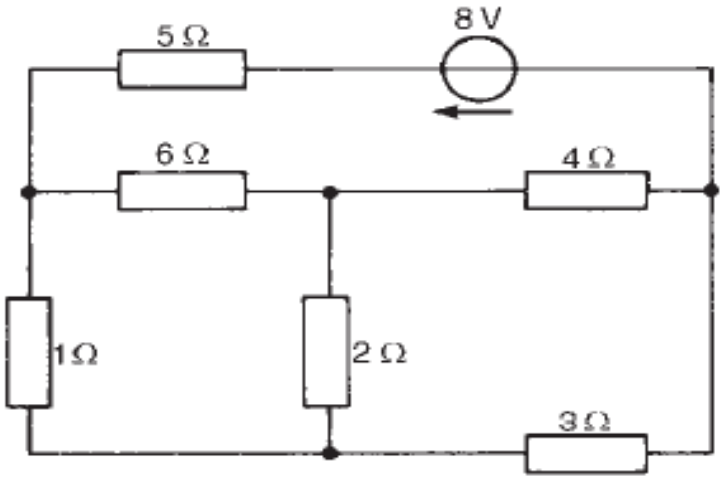


Fig 1(a).

b) In the network of Fig 1(b), use nodal analysis theorem to determine the voltage $V_{xy}$ .

(8mks)

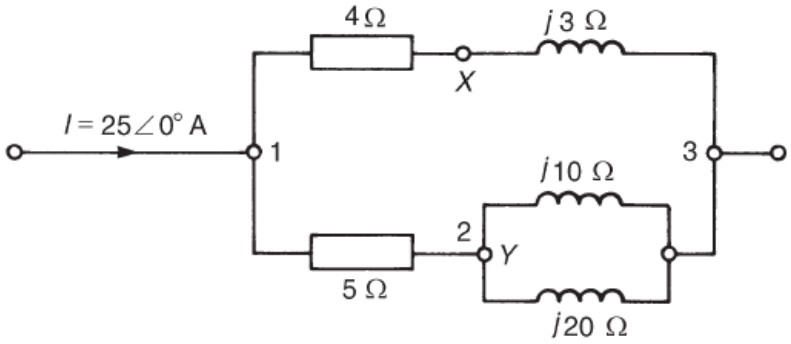


Fig 1(b)

**Question TWO**

a) A capacitor is connected in series with a 40Ω resistor across a supply of frequency 60HZ. A Current of 3A flows and circuit impedance is 50Ω. Determine the:

(i) Value of capacitance
(ii) Supply voltage
(iii) Phase voltage between supply voltage and current
(iv) Potential difference across the resistor
(v) Potential difference across the capacitor (10mks)

b) A coil of negligible resistance and inductance 100mH is connected in series with a capacitor 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 and capacitance at resonance
(iv) Q-factor of the circuit. (10mks)

**Question THREE**

a) (i) State Thevenin's theorem

(ii) Fig 3(a) represents a wheatstone bridge network. Using Thevenin's theorem, determine the current flowing through the 32Ω resistor. (8mks)

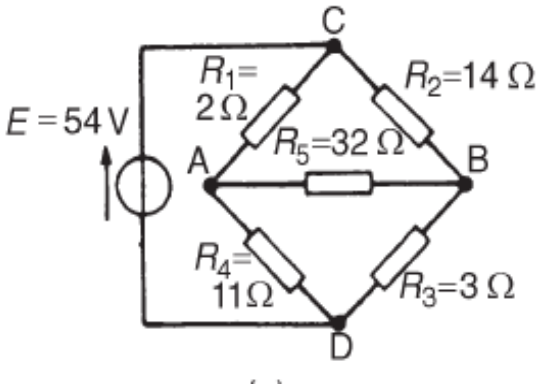


Fig 3(a)

b) In the network of Fig 3(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)

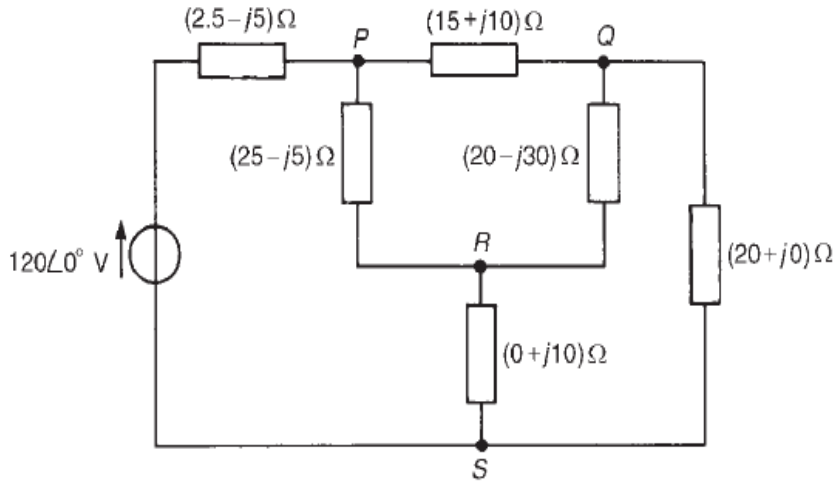


Fig 3(b)

**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. (10mks)

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

   $f_c = \frac{1}{\pi\sqrt{LC}}$ (10mks)

**Question FIVE**

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

   I = 120 sin($100\pi t$ + 0.36) Amperes. Determine:

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

b) A circuit containing a resistor in series with a capacitor takes 100watts at a power factor of 0.5 from 100V, 60HZ supply. Determine;
   (i) The current flowing in the circuit.
   (ii) The phase angle
   (iii) The resistance
   (iv) The impedance
   (v) The capacitance (10mks)