KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2010/2011

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER ENGINEERING

SCE 213: CIRCUIT THEORY I

DATE: Tuesday 23rd November, 2010 **TIME:** 11.00 a.m. – 1.00 p.m.

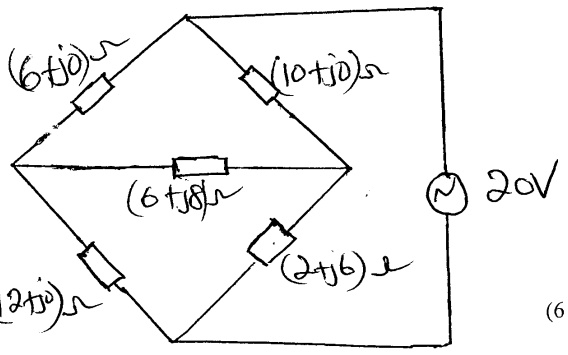
INSTRUCTIONS

Attempt Questions ONE and any other TWO questions.

QUESTION ONE

(a) (i) Explain Kirchoff's laws. (2 Marks)

(ii) For the network shown in Fig Q1(a) calculate the current in the (6 + j8) impedance.



FigQ1(a) (6 Marks)

(b) (i) Explain the Maximum Power Transfer Theorem. (3 Marks)

(ii) Describe why impedance matching is of importance in communication circuits.(3Marks)

(c) (i) Explain what is meant by the following terms:

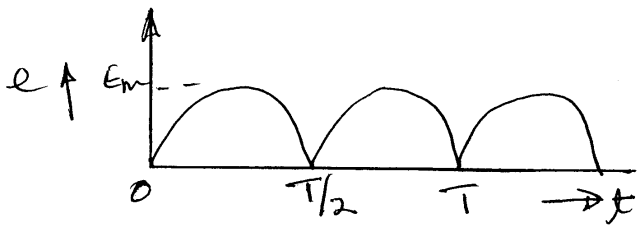
(I) frequency

(II) peak factor

(III)R.M.S value

(IV)amplitude (4 Marks)

(ii) Determine the average and r.m.s valies of the full wave rectified sine wave voltage shown in Fig Q1(c)(ii). (4 Marks)



FigQ1(c)(ii)

(d) (i) Explain what is meant by the power factor in an A.C circuit. (2 Marks)

(ii) A circuit having a resistance of 12 , an inductance of 0.15 H and a capacitance of 100uF in series is connected across a 100V,50 Hz supply. Calculate the impedance, current and phase difference between the current and the supply voltage. (3 Marks)

(e) Prove that the node voltage equations can be arranged into a general matrix form;

$$[Y][V]=[I]$$

Where $[Y]$= symmetrix admittance matrix

$[V]$= voltage source matrix. (3 Marks)

QUESTION TWO

a) Show that in all A.C circuit with a capacitor C the voltage lags the current by an angle of II/2.

b) A coil of resistance 50Ω and inductance 0.318H is connected in parallel with a circuit computing a 75Ω resistor in series with a $159\mu f$ capacitor. The resulting circuit is connected to a 240V, 50Hz A.C supply. Calculate the;

i) Supply current

ii) Circuit impendence resistance and reactance. (14 Marks)

QUESTION THREE

a) The instantaneous values of two attending voltages are represented by $\ell_1 = 60\sin\theta volts$ and $\ell_2 = 40\sin(\theta - \pi/_3)$ volts. Derive an expression for the instantaneous value of the

i) Sum

ii) Difference of these two voltages. (8 Marks)

b) i) Determine the load impedance that can be connected across terminals A and B for maximum power transfer to the load impedance for the circuit shown in Fig 2(b). (8 Marks)

ii) Calculate the maximum power transferred to the load. (4 Marks)

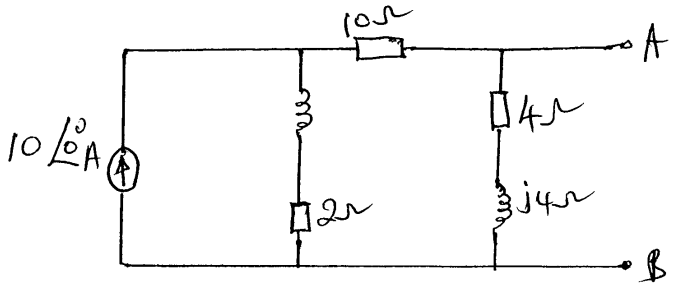


Fig 2(b)

QUESTION FOUR

a) i) with the aid of circuit diagram explain Millinan's Theorem (4 Marks)

ii) For the circuit shown in Fig Q 4(a) derive the mash equation in matrix form. (6 Marks)

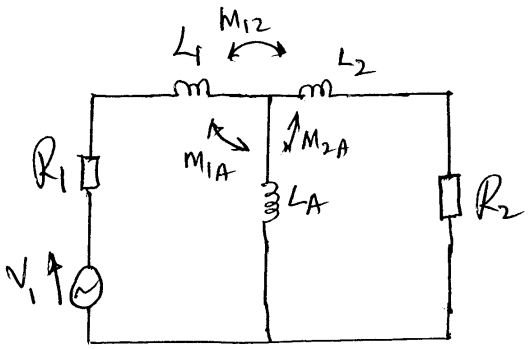


Fig Q 4(a)

b) A network is arranged as shown in Fig Q4(b). Calculate the value of the current in the 8 Ω resistor. (10 Marks)

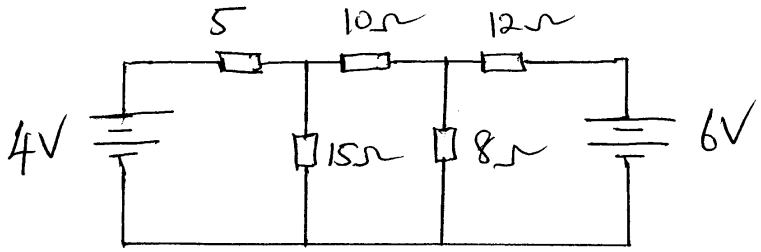


Fig Q 4(b)

QUESTION FIVE

a) Briefly explain the impedance function as applied in steady state andips in dectric circuits

(4 Marks)

b) For circuit shown in fig Q 5, determine;

i) *z(jw)*

ii) Given $\mu = \cos wt$, for w =9.9, calculate the current in all the elements and Is.

iii) The value of w_o, for which Is and v are in phase

iv) W_2 at which $|z(jw_2)| = |z(jw_1)|$ (16 Marks)

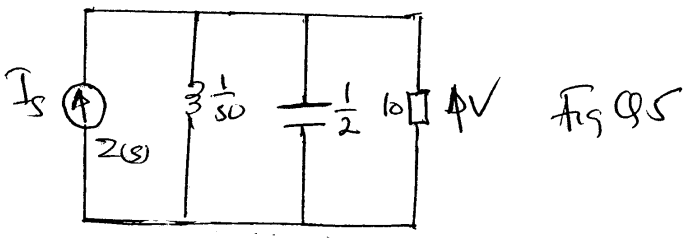


Fig Q5