

International Islamic University Chittagong (IIUC)
Department of Electronic and Telecommunication Engineering
Final Examination

Program: **B.sc (Engg.)**
 Course Code: **EEE-1243**
 Total Marks: **50**

Semester: **Autumn 2023**
 Course Title: **Electrical Circuit II AC**
 Time: **2 Hours 30 Minutes**

- (i) Answer all the questions. The figures in the right-hand margin indicate full marks.
 (ii) Course Outcomes (COs) and Bloom's Levels are mentioned in additional Columns.

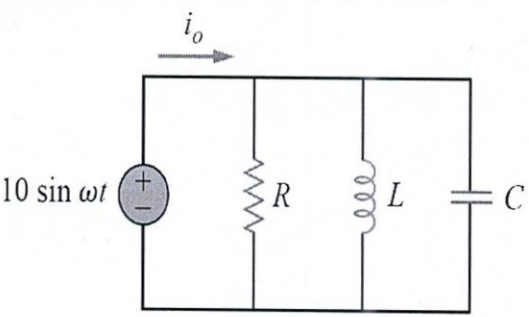
Course Outcomes (COs) of the Questions

CLO1	Acquire basic knowledge on AC quantities and different waveforms and their applications.
CLO2	Understand and Recognize AC Circuit analysis methods and the network theorems for AC.
CLO3	Familiar with single phase and three phase AC circuit and their Applications.

Bloom's Levels of the Questions

Letter Symbols	R	U	Ap	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

PART A

Q1.	a)	Explain the frequency response of a circuit. Explain and classify the transfer function.	CLO1	U	5
	b)	In the parallel RLC circuit in Fig. 1(b), let $R = 8\text{ k}\Omega$, $L = 0.2\text{ mH}$, and $C = 8\text{ }\mu\text{F}$. - Calculate ω_0, Q, and B. - Find ω_1 and ω_2. - Determine the power dissipated at ω_0, ω_1 and ω_2.  Figure 1(b)	CLO1	Ap	5
Q2.	a)	A positive-sequence, balanced Δ -connected source supplies a balanced Δ -connected load. If the impedance per phase of the load is $18+j12\text{ }\Omega$ and $I_a = 22.5\angle 35^\circ\text{ A}$, find I_{AB} and V_{AB} .	CLO3	Ap	5
	b)	The three-phase balanced load in Fig. 2(b) has impedance per phase of $Z_Y = 10+j6\text{ }\Omega$. If the load is connected to 240 Volts lines, predict the readings of the watt meters W_1 and W_2 . Find P_T and Q_T .	CLO3	Ap	5

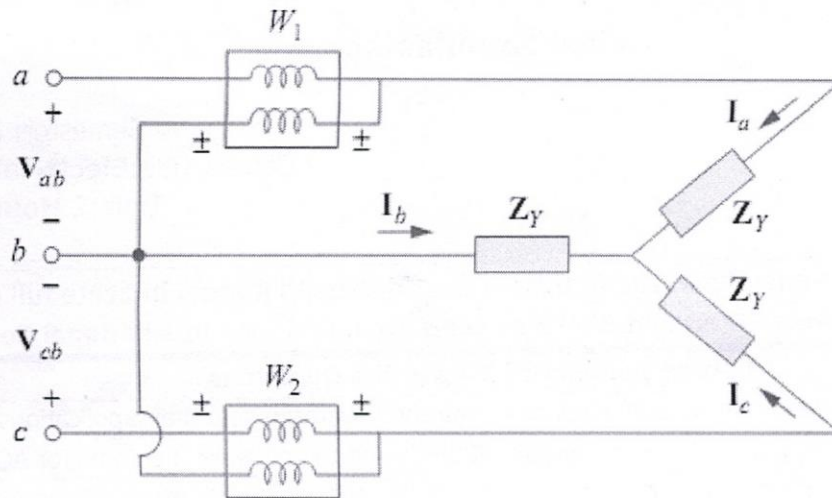


Figure 2(b)

OR

Q2.

Calculate the line currents in the three-wire Y-Y system of Fig. 2. Also Determine the total average power, reactive power, and complex power at the source and at the load.

CLO3

Ap

10

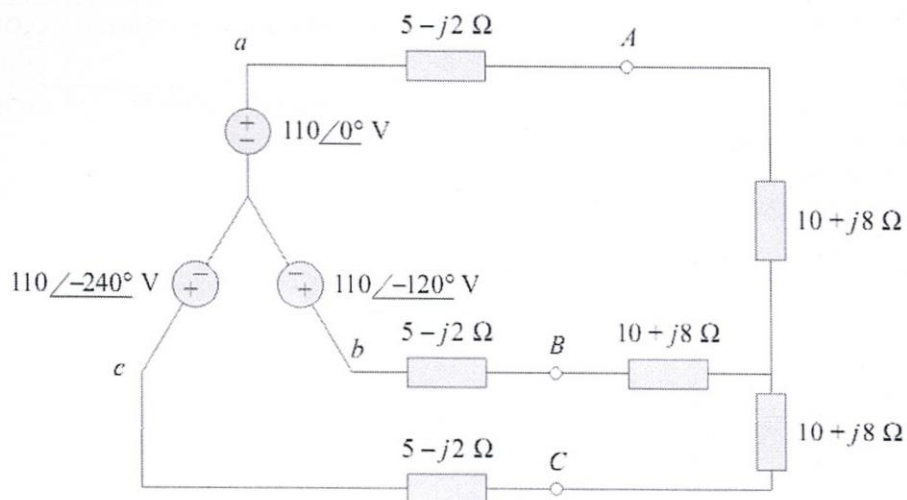


Figure 2

PART B

Q3.

a)

The unbalanced Y-load of Fig. 3(a) has balanced voltages of 100 V and the *acb* sequence. Calculate the *line currents* and the *neutral current*. Take $Z_A = 20 \Omega$, $Z_B = 30 + j5 \Omega$, $Z_C = 6 - j8 \Omega$.

CLO3

Ap

5

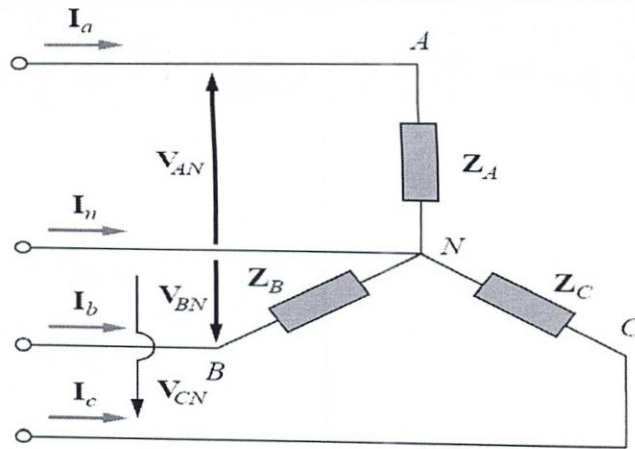


Figure 3(a)

- b) Find the *line currents* and *phasor diagram* in the *unbalanced three-phase circuit* of Fig. 3(b).

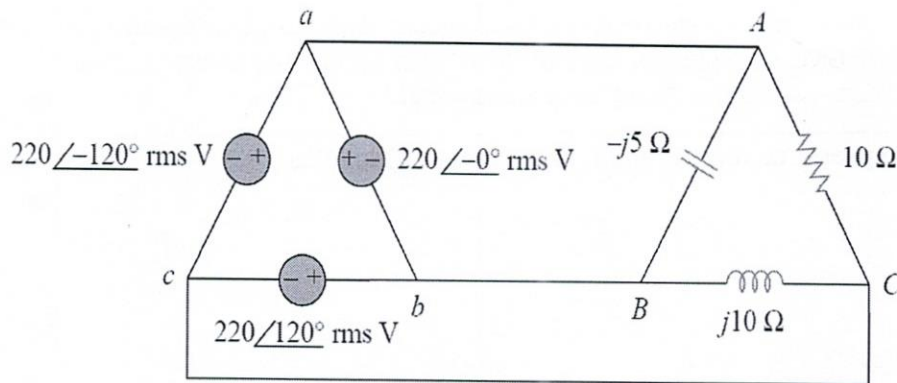


Figure 3 (b)

OR

Q3.

For the unbalanced circuit in Fig. 3, find: (i) the line currents, (ii) the total complex power absorbed by the load, and (iii) the total Complex power absorbed by the source.

CLO3

Ap

10

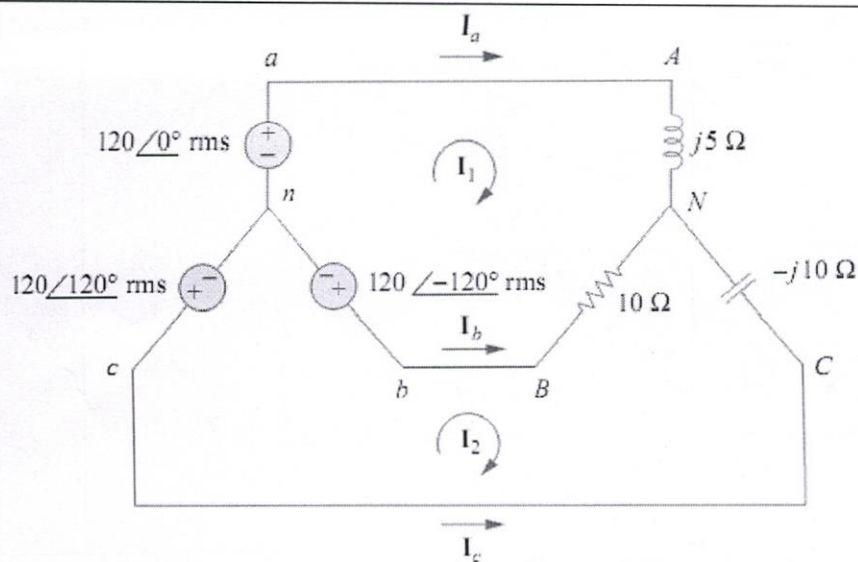


Figure 3

Q4. a) What does it mean by "conductively coupled circuit" and "electromagnetically coupled circuit"? Give examples for both of them. Also explain the terms "mutual inductance," "ideal transformer," and "auto transformer."

CLO3

U

5

b) Determine the phasor currents I_1 and I_2 in the circuit of Fig. 4(b)

CLO3

Ap

5

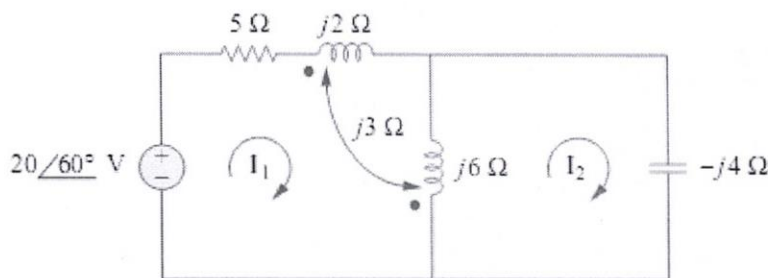


Figure 4(b)

Q5. a) Show that a series LR circuit is a lowpass filter if the output is taken across the resistor. Calculate the corner frequency f_c if $L = 2\text{mH}$ and $R = 10\text{K}\Omega$.

CLO1

C

5

b) If the bandstop filter in Fig. 5(b) is to reject a 200-Hz sinusoid while passing other frequencies, calculate the values of L and C . Take $R = 150\Omega$ and the bandwidth as 100 Hz.

CLO1

E

5

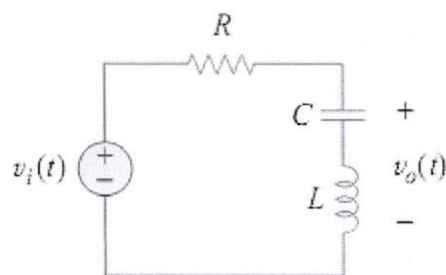


Figure 5(b)