International Islamic University Chittagong

Department of Electrical and Electronic Engineering

B. Sc. Engineering in EEE

Mid-term Examination, Spring 2023

Course Code: **EEE 1201** Course Title: **Electrical Circuits II**

Time: 1 hour 30 minutes Full Marks: 30

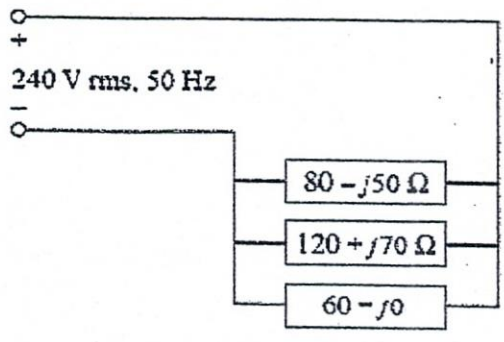
(i) Answer all the questions. The figures in the right-hand margin indicate full marks.

(ii) Course Outcomes (COs) and Bloom's Levels are mentioned in additional Columns.

Course Outcomes (COs) of the Questions	
CO1	Reflect a basic understanding of alternating current waveforms, phase shifting, impedance, Power factor, impedance and phasor diagram, circuit theorems for solving series-parallel circuits, poly phase system, magnetic coupling, resonance, and two port networks.
CO2	Apply complex variable, various circuit rules and theorems for solving complex series parallel networks.
CO3	Design various series-parallel resonant circuits, passive filters, and two port networks.

Bloom's Levels of the Questions						
Letter Symbols	**R**	**U**	**Ap**	**An**	**E**	**C**
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

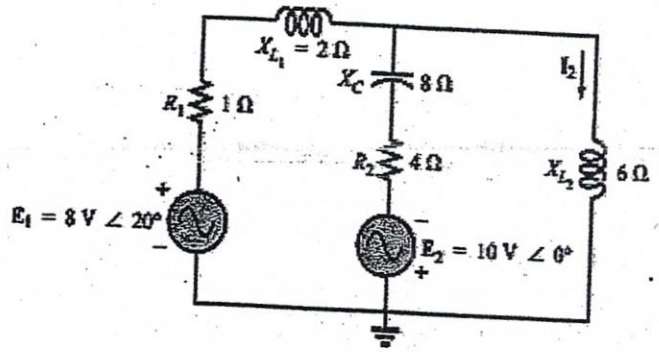
1)	a)	An alternating voltage is given by $V = 141.4 \sin 314t$. Find the Frequency, RMS value of voltage, average value of voltage, and instantaneous value of the voltage when t is 3 ms.	CO1	App	3
1	b)	What is meant by the RMS value? Derive the equation for the RMS voltage of a sinusoidal waveform.	CO1	U, An	1+3
1)	c)	Define Phasors. Determine the phase angle formed by $V_1 = -10 \cos(\omega t + 60)$ and $V_2 = 23 \sin(\omega t - 20)$. State which sinusoid is lagging.	CO1	R, E	1+2
2)	a)	Show that a pure inductor and capacitor in a circuit fed by sinusoidal alternating current consume zero average power.	CO1	An	5
2)	b)	Calculate the total complex power and p.f for the electrical network shown in **"Fig.02"**.	CO2	App	5



"Fig.02" Electrical network.

3) a) Derive the expression of impedance and phase angle of a series RC circuit. Also sketch the impedance triangle of the series RC circuit. CO1 An 5

3) b) Using the approach to mesh analysis, find the current I_2 in **"Fig. 03."** CO2 App 5

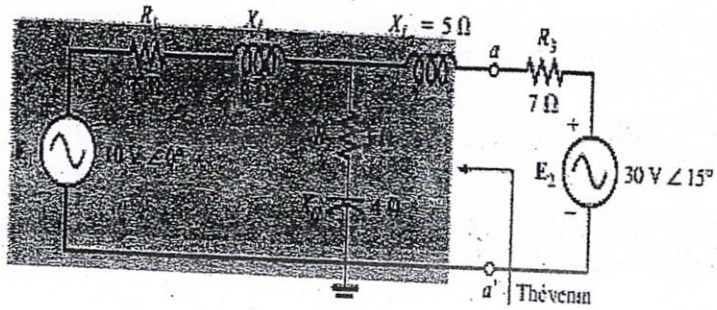


"Fig. 03." Electrical network.

OR

3) a) Derive the equation of maximum average power in any AC circuit using maximum average power transfer theorem. CO1 An 5

3) b) Find the Thévenin equivalent circuit for the network external to branch a-a′ in **"Fig. 05."** CO2 E 5



"Fig. 05." Electrical network.