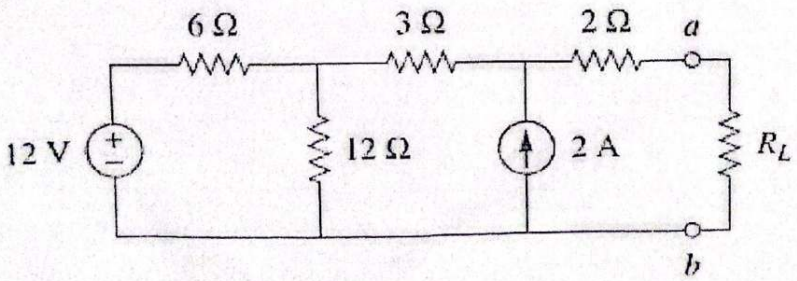
SOLVED

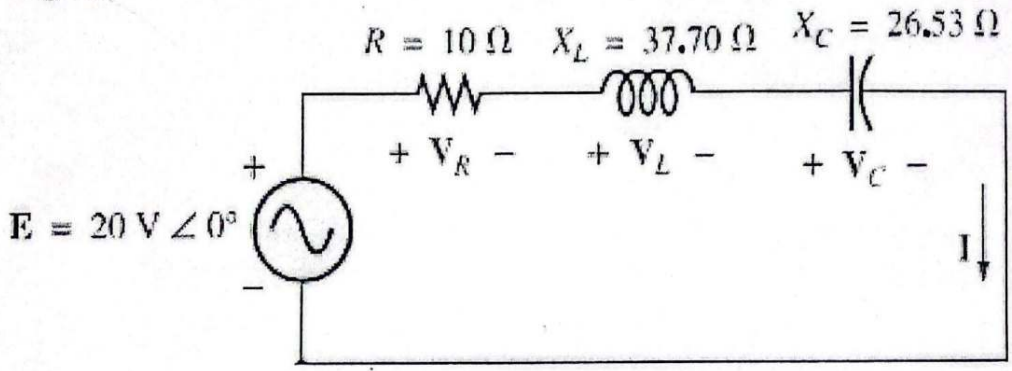
Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Final Examination, Summer 2026
Course Code: CSE121 Course Title: Electrical Circuits
Level: 1 Term: 3 Batch: 70

Time: 2:00 Hrs **Full Marks: 40**

Answer all the following *Three* questions
[All portions of each question must be answered sequentially]

Q1.	*a.*	Draw the commonly used waveforms in the Electrical and Electronic Lab.	**5x1 =5**	**CO1**
	b.	Define periodic waveforms in AC circuits.		
	c.	Write a short note on the RMS value of AC current.		
	d.	Write a short note on the effects of zero (DC) and infinity frequencies on a pure inductive circuit.		
	e.	Define Phasor in an RLC circuit.		
Q2	*a.*	Show that for maximum power transfer, the load resistance must be equal to the Thevenin resistance ($R_L = R_{TH}$) as seen from the load.	**2x5 =10**	
	b.	Show that the real power in an AC network is, $P = VI\cos\theta$.		
Q3.	*a.*	*The current through a 100 mH coil is, $i = 10\sin(300t - 30°)$; Solve for* (i) *the sinusoidal expression of voltage across the inductor.* (ii) *Sketch the waveforms of v (t) and i (t).*	**2x5 =10**	**CO2**
	b.	The voltage across a 10 μ-F capacitor is, $v = 200\sin(400t - 60°)$; Using Complex algebra solve for (i) the sinusoidal expression of current through the capacitor. (ii) Sketch the waveforms of v (t) and i (t) and also draw the phasor diagram.		
Q4.	*a.*	Analyze the following circuit using the Maximum Power Transfer Theorem to determine the value of R_L for maximum power transfer and the corresponding maximum power delivered to the load. 	**5**	**CO3**

	b.	Analyze the following *RLC* circuit to determine the values of (i) Total Impedance, Z_T (ii) Total Current, I (iii) V_R , V_L and V_C (iv) Total Power factor, Cosθ also indicate whether it is leading or lagging (v) Total Average Power delivered by the source to the circuit (vi) Draw the impedance diagram (vii) Draw the Phasor diagram.  	**10**	

ANSWER SHEET

Q3. a.

(i) v(t) = 300 sin(300t + 60°) V

(ii) Waveforms: v(t) leads i(t) by 90° (both sinusoids, same frequency)

Q3. b.

(i) i(t) = 0.8 sin(400t + 30°) A

(ii) Phasor: I = 0.8∠30° A, V = 200∠-60° V (I leads V by 90°)

Q4. a.

R_{TH} = 9 Ω

V_{TH} = 22 V

$R_L = R_{TH}$ = 9 Ω

P_{max} = 13.44 W

Q4. b.

(i) Z_T = 14.99 Ω ∠ 48.19° (10 + j11.17 Ω)

(ii) I = 1.334 A ∠ -48.19°

(iii) V_R = 13.34 V ∠ -48.19°, V_L = 50.29 V ∠ 41.81°, V_C = 35.39 V ∠ -138.19°

(iv) Cosθ = 0.667 (Lagging)

(v) P = 17.79 W

(vi) & (vii) Impedance diagram and Phasor diagram: see attached sketches

YouTube Channel : https://www.youtube.com/channel/UCvmJ1-YHQw4J3lkOzVebT1w