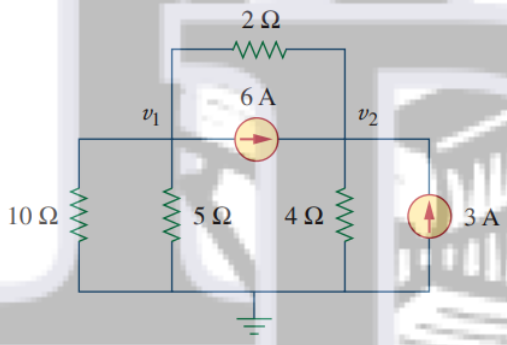
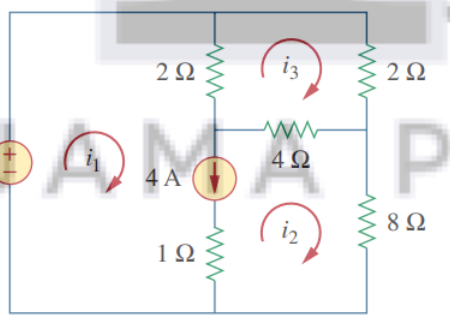
Question Format & QP Setter Information

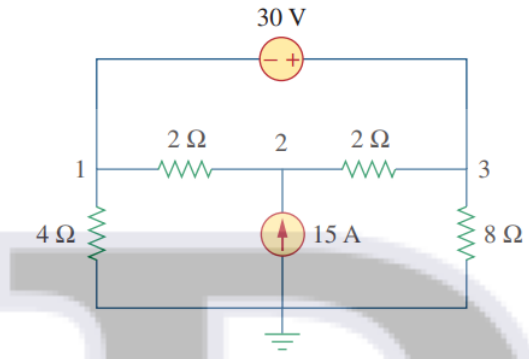
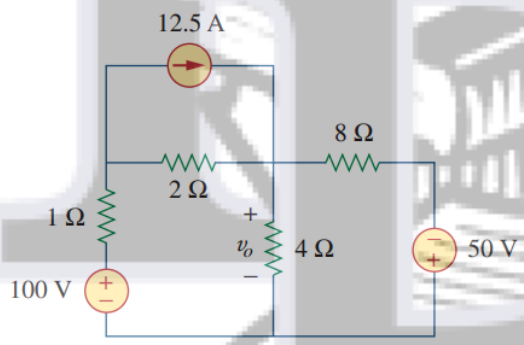
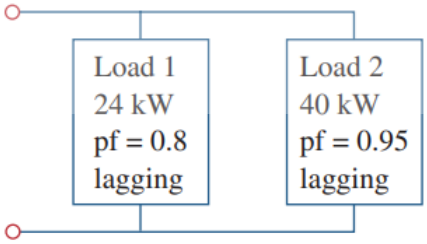
Name of Examination	**Continuous Assessment Test** (CAT-1), **Fall 2021-22 Semester**, (October 2021)	
Slot: A2	Course Mode: **CBL**	**Class Number (s):**VL2021220105993

Course Code:	EEE101	Course Title:	Basic Electrical Engineering

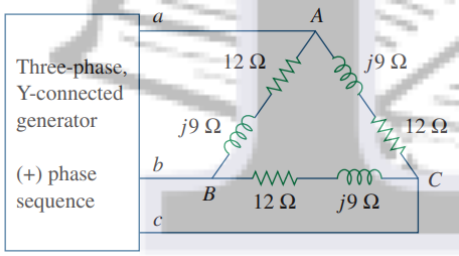
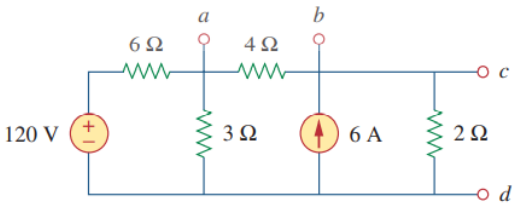
*General Instructions (if any):**1. OPEN BOOK Examinations, 2. Answer ALL questions***

Q. No.	Sub-division	Question Text	Marks	Unit / Module No.	HOTS? (Y/N)	Difficulty Level E/A/T	CO
Answer All Questions			Total Marks: 3 × 10 Marks = 30				
1.	a)	Determine node voltages for the circuit shown in Figure 1(a) using '**Nodal Analysis**' and obtain the maximum power dissipated in the resistor.  Figure 1(a)	10	1	N	(E)	CO1
		(OR)					
	b)	Determine branch currents for the circuit shown in Figure 1(b) using '**Mesh Analysis**' and obtain the maximum power dissipated in the resistor.  Figure 1(b)	10				
		(OR)					

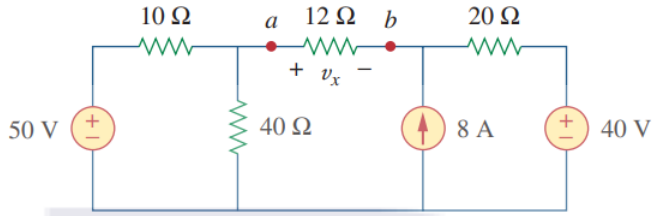
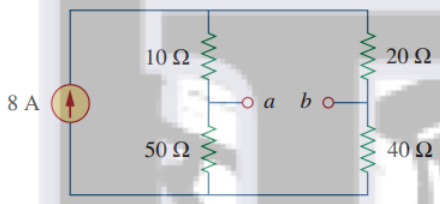
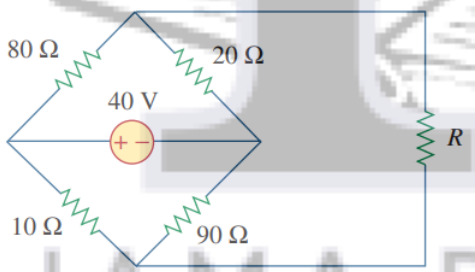
PAJAMA PADHAI

	c)	Determine node voltages for the circuit shown in Figure 1(c) and obtain the maximum power dissipated in the resistor.  Figure 1(c)	10				
		(OR)					
	d)	Determine branch currents for the circuit shown in Figure 1(d) and obtain the maximum power dissipated in the resistor.  Figure 1(d)	10				
2.	a)	A 120-V RMS 60-Hz source supplies two loads connected in parallel, as shown in Figure 2(a). Determine (a) Find the power factor of the parallel combination (b) Calculate the value of the capacitance connected in parallel that will raise the power factor to unity (c) the supply current after power factor correction, the current taken by the capacitor.  Figure 2(a)	10	**2**	**Y**	**(T)**	**CO2**
		(OR)					

RAJAMA PADHAI

	b)	A 250 V, 50 Hz single-phase supply feeds the following loads (i) incandescent lamps taking a current of 10 A at unity power factor, (ii) fluorescent lamps taking 8 A at a power factor of 0.7 lagging, (iii) a 3 kVA motor operating at full load and at a power factor of 0.8 lagging and (iv) a static capacitor. Determine, for the lamps and motor, (a) the total current, (b) the overall power factor and (c) the total power. (d) Find the value of the static capacitor to improve the overall power factor to 0.975 lagging.	10				
		(OR)					
	c)	A coil of inductance 0.12 H and resistance 3 kΩ is connected in parallel with a 0.02 μF capacitor and is supplied at 40 V at a frequency of 5 kHz. Determine (a) the current in the coil, and (b) the current in the capacitor. (c) Draw to scale the phasor diagram and measure the supply current and its phase angle; check the answer by calculation. Determine (d) the circuit impedance and (e) the power consumed.	10				
		(OR)					
	d)	Each phase of a delta-connected load comprises a resistance of 12 Ω and an inductor of 9 Ω in series as shown in Figure 2(d). The load is connected to a star connected generator with V_{an} = 220∠60° V, 50 Hz, 3-phase supply. Calculate (a) the phase current, (b) the line current, (c) the total power dissipated and (d) the kVA rating of the load. Draw the phasor diagram.  Figure 2(d)	10				
3.	a)	Determine **Thevenin's equivalent circuit** across the terminals '**c**' and '**d**' for the circuit shown in Figure 3(a).  Figure 3(a)	10				
		(OR)					

PAJAMA PADHAI

	b)	State **Source Transformation technique** and determine Thevenin's equivalent circuit across the terminals '**a**' and '**b**' for the circuit shown in Figure 3(b) using source transformation technique.  Figure 3(b)	10	1	Y	(A)	CO1
		(OR)					
	c)	State **Maximum Power Transfer Theorem** and determine maximum power delivered to load connected across the terminals '**a**' and '**b**' for the circuit shown in Figure 3(c).  Figure 3(c)	10				
		(OR)					
	d)	State **Maximum Power Transfer Theorem** and determine maximum power delivered to the load 'R' for the circuit shown in Figure 3(d).  Figure 3(d)	10				

PAJAMA PADHAI

Dr M V Chilukuri (23/10/21)
Signature with date