VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Reg. No.:

Name:

Continuous Assessment Test II - December 2022

Programme	:	B.Tech (EEE/ECE/ECM)	Semester	:	Fall 2022 - 23
Course	:	Basic Electrical and Electronics Engineering	Code	:	BEEE102L
Faculty	:	Prof. R. Srimathi (CH2022231700055)		:	Prof. Pritam Bhowmik (CH2022231700060)
	:	Prof. R. Jayapragash (CH2022231700062)		:	Prof. G. Angeline Ezhilarasi (CH2022231700064)
	:	Prof. T. Prasath (CH2022231700966)		:	Prof. S. Vimala Gayathri (CH2022231701008)
			Slot(s)	:	E2+TE2
Time	:	$1\frac{1}{2}$ Hours	Max. Marks	:	50

Answer ALL Questions

1. A Y-connected balanced three-phase generator with an impedance of $(0.8 + j0.6)\Omega$ per phase is connected to a Y-connected balanced load with an impedance of $(10 + j22)\Omega$ per phase. The voltage between phase-a and the neutral of the Y-connected source is $V_{an} = 110 \angle -30^{o}$ V (10)

   (a) Find the line voltages, line currents and phase currents, assuming a positive sequence for the source voltages.

   (b) Find the current through the neutral wire and draw the phasor diagram showing the line voltages, line currents and phase currents.

2. A magnetic circuit shown in Fig. 1 has an iron core with a relative permeability of 800 and a 600 turn coil wound on the iron core. Find the current i in the exciting coil required to establish a flux of 120μWb in the air gap. (10)

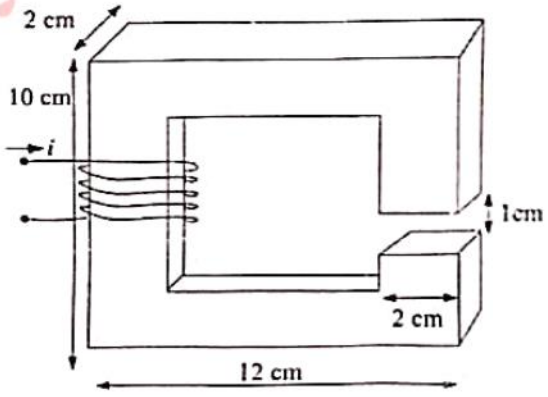

Fig. 1

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3. An transformer circuit is shown in Fig. 2 where the number of turns in the primary winding is 500. Neglect flux leakage and fringing. (10)

   (a) Compute the self inductances of the coils, if the core has a uniform reluctance of 10^8 Ampere-turns/Wb.

   (b) Neglect the reluctance and find the power delivered to the load, if the source voltage is $V_s(RMS) = 300\sqrt{2}\ \angle 70^\circ$ V and the load impedance is $Z_L = (5 + j10)\Omega$.

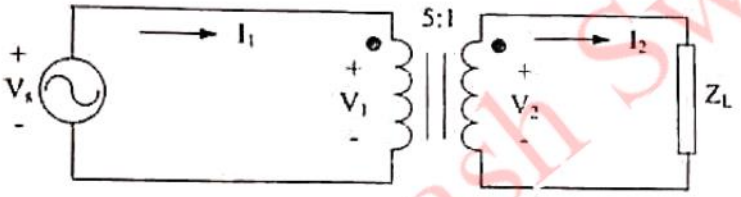

Fig. 2

4. (a) Express (10)
   $(47.25)_8$ as binary and decimal numbers and
   $(11101.01)_2$ as decimal, octal and hexadecimal numbers.

   (b) Perform the eight bit signed two's complement arithmetic operation $(+55)_{10} + (-12)_{10}$. Specify if there is an overflow in the result.

5. Design a combinational circuit to detect the prime number from 0 to 7. The output F should be HIGH when the input is a prime number and LOW otherwise. (10)

   (a) Draw the truth table showing the output function F and write the boolean expression in the canonical form as sum of minterms.

   (b) Using Karnaugh map, obtain the minimum product of sums (POS) form of the function F and realize the reduced POS expression using logic gates.

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Reg. No.: 22BLC1251
Name: Aravalyanil Chattopadhyay

Continuous Assessment Test I - November 2022

Programme	: B.Tech (EEE/ECE/ECM)	Semester	:	Fall 2022 - 23
Course	: Basic Electrical and Electronics Engineering	Code	:	BEEE102L
Faculty	: Prof. R. Gunabalan (CH2022231700053)	Faculty	:	Prof. R. Srimathi (CH2022231700055)
	: Prof. J. Meenakshi (CH2022231700058)		:	Prof. Pritam Bhowmik (CH2022231700060)
	: Prof. R. Jayapragash (CH2022231700062)		:	Prof. G. Angeline Ezhilarasi (CH2022231700064)
	: Prof. T. Prasath (CH2022231700066)		:	Prof. S. Vimala Gayathri (CH2022231701008)
		Slot(s)	:	E2+TE2
Time	: 1½ Hours	Max. Marks	:	50

Answer ALL Questions

1. (a) Apply superposition principle to find V_o in the circuit shown in Fig. 1. (5)

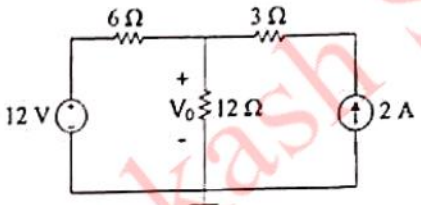

Fig. 1

(b) Apply nodal analysis to find V_o in the circuit shown in Fig. 2. (5)

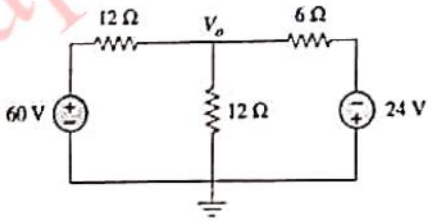

Fig. 2

2. Find the current through all the branches in the circuit shown in Fig. 3. using mesh analysis. (10)

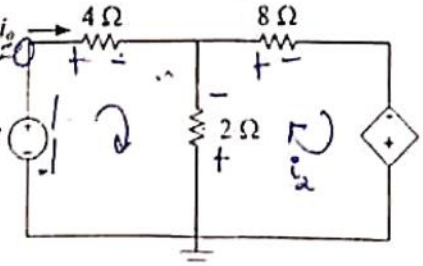

Fig. 3

$\Rightarrow 12\text{ V} = 2i_o - 2i_2$

$0 = -12i_o + 10i_2$

$\Rightarrow 12 = 6i_o - 2i_2$

$0 = -12i_o + 10i_2$

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3. Find the value of the load resistance R for which maximum power will be delivered to the load in the circuit shown in Fig. 4. Compute the maximum power delivered to the load. (10)

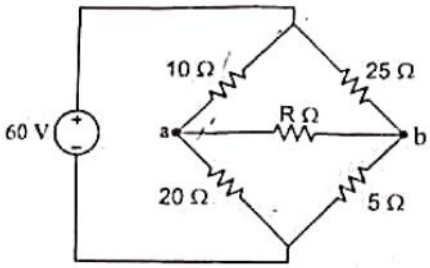

Fig. 4

4. (a) Find the total resistance across the terminals $a-b$ and the current I in the circuit shown in Fig. 5 (5)

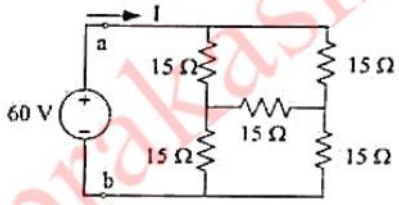

Fig. 5

(b) Find the voltage across the terminals AB ($v_{AB}(t)$) as shown in Fig. 6. Draw the phasors V_1 and V_2 and find the phase angle between them, when $v_1(t) = 50\cos(200\pi t - 30)$ V and $v_2(t) = 60\sin(200\pi t + 30)$ V. (5)

Fig. 6

5. A Resistor $R = 10\ \Omega$ and an inductor $L = 0.01H$ are connected in series to a sinusoidal voltage source $v(t) = 110\sin(100t + 30)$ V. Compute the following: (10)

(a) Amplitude and Time Period of $v(t)$.

(b) RMS value of the current $i(t)$.

(c) Average power absorbed by each element in the circuit.

(d) Reactive power supplied by the source and power factor.

(e) $i(t)$ when $v(t) = 110$ V.

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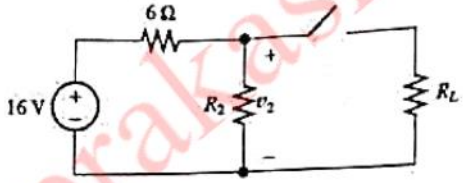
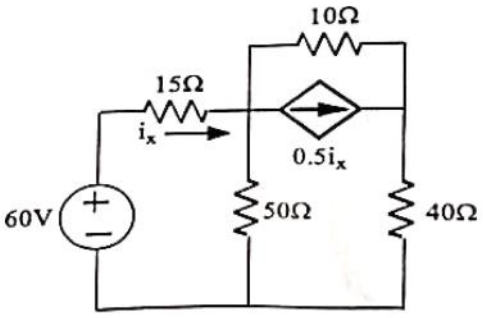
Continous Assessment Test (CAT-1) – March 2023

Programme	:	B.Tech (Mech/Mechatronics/Mech with EV)	Semester	:	Winter 2022-23
Course	:	Basic Electrical and Electronics Engineering	Code	:	BEEE102L
			Class Nbr	:	CH2022232300587 CH2022232300609 CH2022232300605 CH2022232300607
Faculty	:	K.Jamuna, M. Subashini, Ashly Mary Tom, Vimala Gayathri.S	Slot	:	B1
Time	:	One and half Hours	Max. Marks	:	50

Answer ALL the Questions

Q.No	Question Description	Marks
1.	Consider the circuit shown in figure 1. With the switch open, the voltage $v_2 = 10$V. On the other hand, with the switch closed, the voltage $v_2 = 8$ V. Determine the values of R_2 and R_L.  **Figure 1**	6
2.	Find the value of the current i_x of the circuit shown in figure 2 using loop analysis.  **Figure 2**	6
3.	An alternating voltage v has a periodic time of 20 ms and a maximum value of 200V. When time $t = 0, v(t) = -75V$. Deduce a sinusoidal expression for $v(t)$ and sketch one cycle of the voltage showing important points. Also find the RMS value of $v(t)$.	6
4.	The resistor of 10Ω and inductor having an inductance of 10mH is connected in series which is supplied by the sinusoidal voltage $v(t) = 10\sin(200\pi t + \pi/6)\,V$. Find the following parameters. a. The current flowing through the circuit b. Voltage across each element in the circuit c. Power factor of the circuit.	6
5.	a. Find the current through 5Ω (Assume to be load resistance) using Thevenin's theorem of the circuit shown in Figure 3.	8

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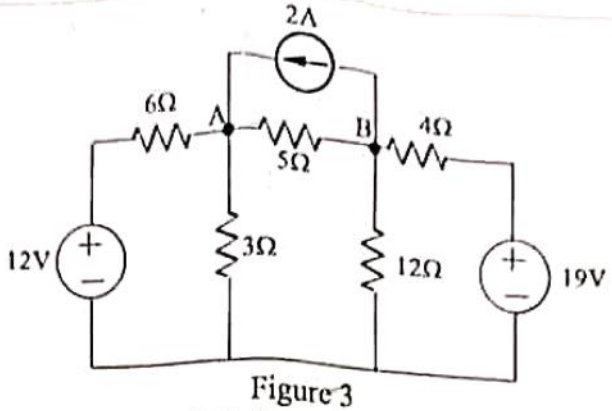

Figure 3

b. Find the value of the load resistance at which the maximum power delivered to the load.
c. Also calculate the maximum power absorbed by the load.

6. Find the voltage (V_o) across the resistor 10Ω as shown in figure 4 using super position theorem. 8

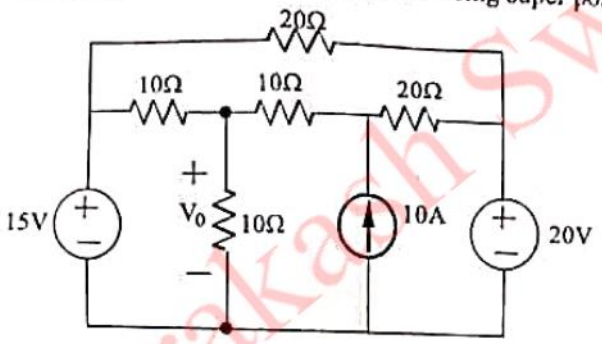

Figure 4

7. Find the rms value, the average value, form factor and peak factor of the waveform shown in Figure 5. 8

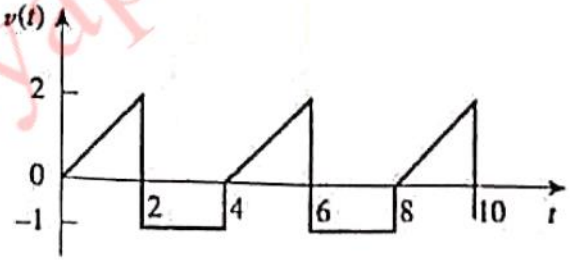

Figure 5

8. $$v(t) = 10\sin(100\pi t + \pi/3)\,V$$
$$i(t) = 8\cos\left(100\pi t - \frac{\pi}{6}\right)A$$
Convert both voltage and current signal as phasor. Which phasor leads?. 2

(OR)

Discuss the cyber tyre (From Guest Lecture)

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