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 $120\mu$Wb in the air gap. (10)

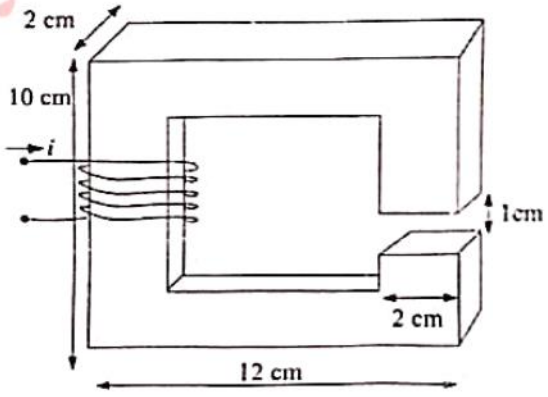


Fig. 1

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 $Z_L = (5 + j10)\Omega$.

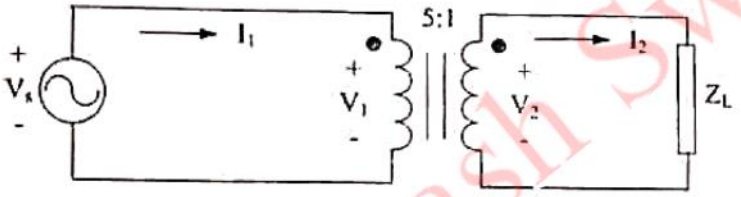


Fig. 2

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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# VIT

Vellore Institute of Technology

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)

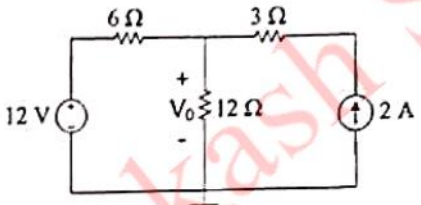


Fig. 1

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

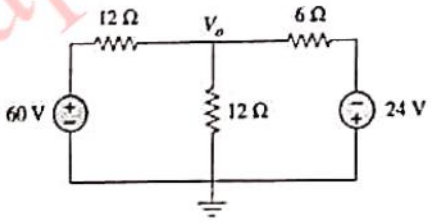


Fig. 2

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

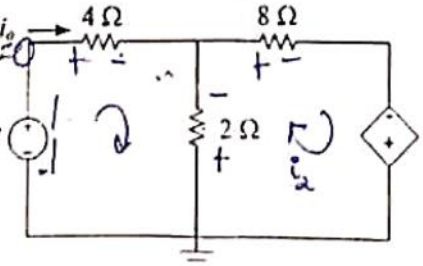


Fig. 3

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

$0 = -12i_o + 10i_2$

$\Rightarrow 12 = 6i_o - 2i_2$

$0 = -12i_o + 10i_2$

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)

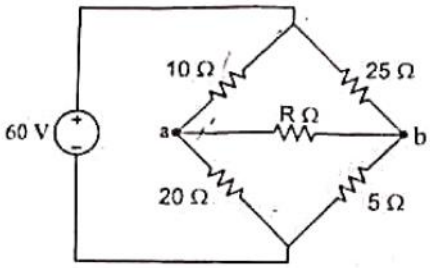


Fig. 4

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

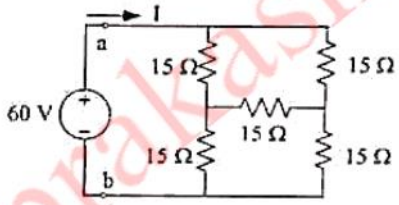


Fig. 5

(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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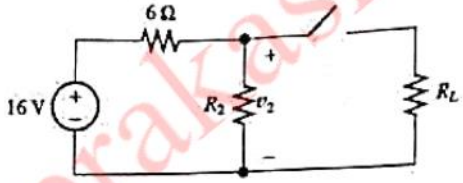
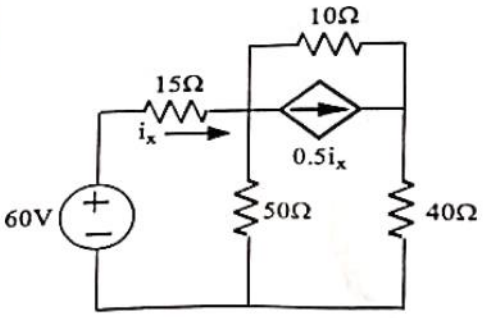
**Continous Assessment Test (CAT-1) – March 2023**

| | | | | | |
|---|---|---|---|---|---|
| Programme | : | B.Tech (Mech/Mechatronics/Mech with EV) | Semester | : | Winter 2022-23 |
| Course | : | Basic Electrical and Electronics Engineering | Code | : | BEEE102L |
| | | | Class Nbr | : | CH2022232300587<br>CH2022232300609<br>CH2022232300605<br>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 $R_L$.<br>  <br><br>**Figure 1** | 6 |
| 2. | Find the value of the current $i_x$ of the circuit shown in figure 2 using loop analysis.<br>  <br><br>**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.<br>a. The current flowing through the circuit<br>b. Voltage across each element in the circuit<br>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 |

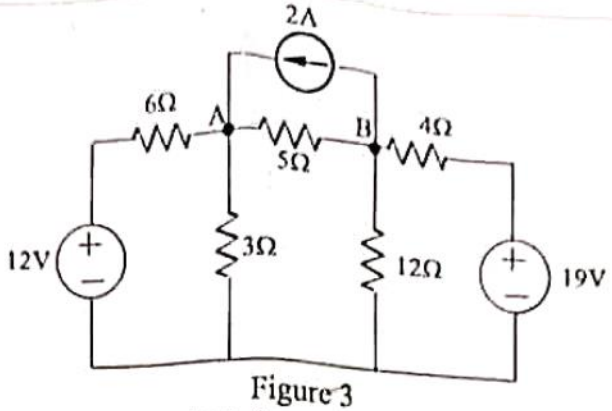



Figure 3

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

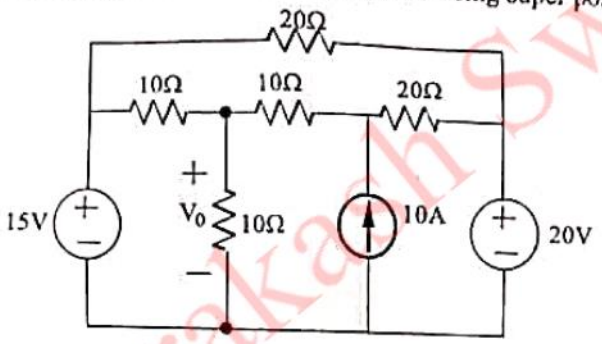



Figure 4

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

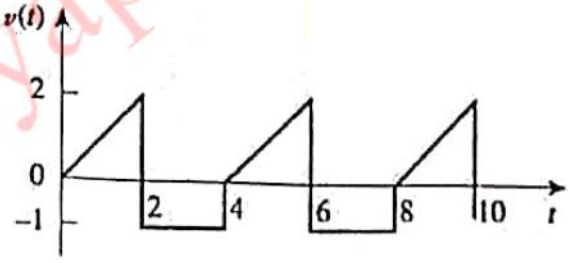



Figure 5

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)

# Let's Connect.....!!

VIT-C 27 (Satya Helpzz)

VIT-C 26 (Satya Helpzz)

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