

**भारतीय सूचना प्रौद्योगिकी संस्थान भागलपुर**  
**Indian Institute of Information Technology Bhagalpur**  
**Bhagalpur – 813210**

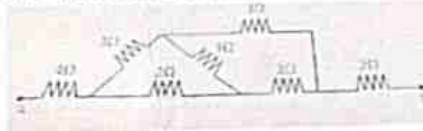
**Electrical Sciences (ECE 101)**  
**Mid Semester Examination (2024-28)**

Duration: 2 Hours

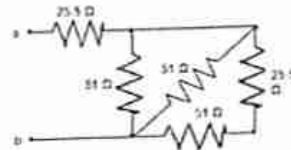
Total Marks: 30

Date: 07<sup>th</sup> October, 2023

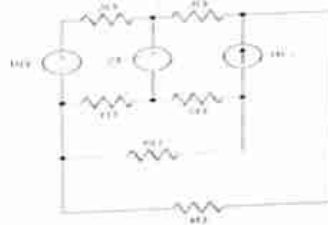
- 1) A) Find the equivalent resistance across the terminal A and B. (2×4)



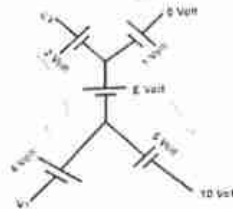
- B) Find the equivalent resistance across the terminal a and b.



- 2) A) Using Nodal method, determine the power of each source. (2×3)



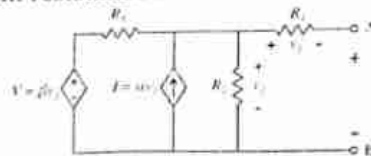
- B) In the circuit of the figure, the value of the voltage source E is.



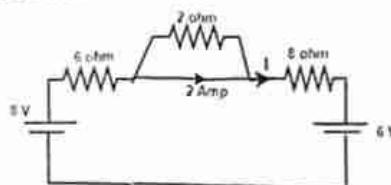
- 3) A) A R-L series circuit draws a circuit current of 5 A when connected across a 50 V, 50 Hz a.c. supply. Assuming the resistance to be 7.5 ohm, find the inductive reactance of the circuit. What is its power factor? (2×4)

- B) An inductive coil consumes  $5 \times 10^2$  W of power across a 110 V, 50 Hz a.c. source while the current through it is 25 A. Determine the resistance and inductance of the coil.

- 4) A). Find Thevenin's equivalent resistance across A and B. (2×4)



- B) Find Current I using superposition Theorem.



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Electrical Sciences (ECE 101)  
End Semester Examination (2024-28)

Duration: 3 Hours

Total Marks: 50

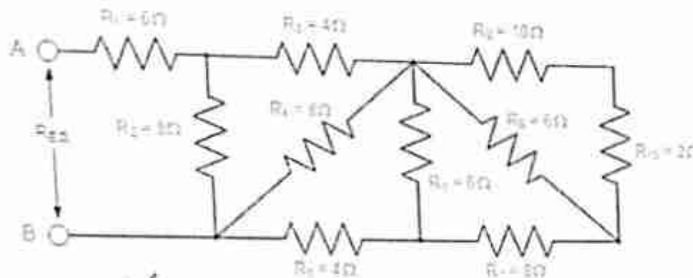
Date: 28<sup>th</sup> November 2024

**Instruction**

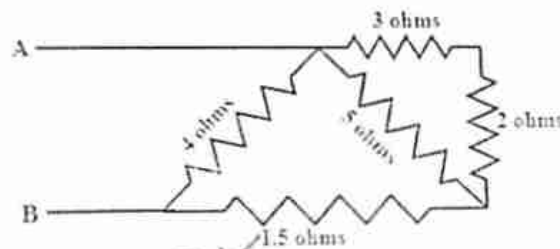
- Attempt all questions. All question carries equal marks.

1) Find the equivalent resistance across the terminal A and B.

(2 × 5)

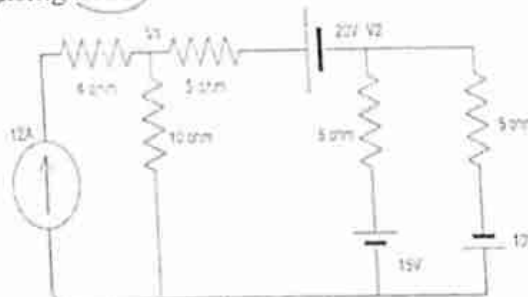


B) Find the equivalent resistance across the terminal A and B.

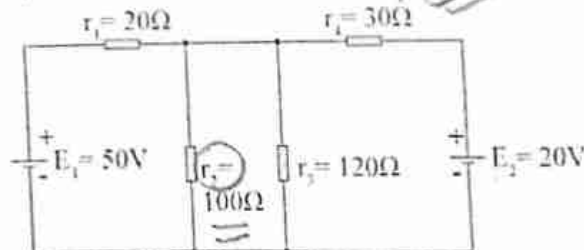


2) A) Find value of  $V_1$  and  $V_2$  using nodal method.

(2 × 5)



B) Using Mesh method, find the current through resistor  $r_2$ .



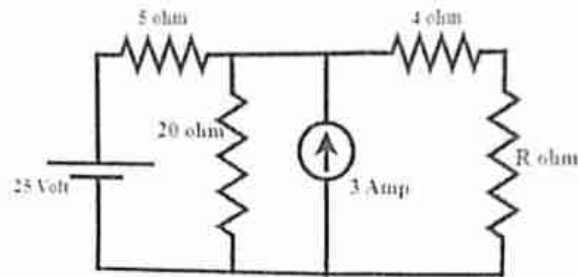
3) A) The value of R required for maximum power transfer and the value of power through R in the network shown is

(2 × 5)

$$\frac{P^2}{4R}$$

$$V_1 = h_{11} I_1 + h_{12} V_2$$

$$I_2 = h_{21} I_1 + h_{22} V_2$$



$$V_1 = Z_{11} I_1 + Z_{12} I_2$$

$$V_2 = Z_{21} I_1 + Z_{22} I_2$$

$$I_2 = \frac{1}{Z_{22}} V_2 - \frac{Z_{21}}{Z_{22}} I_1$$

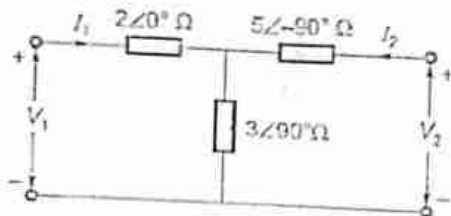
$$h_{21} = -\frac{Z_{21}}{Z_{22}}$$

$$h_{22} = \frac{1}{Z_{22}}$$

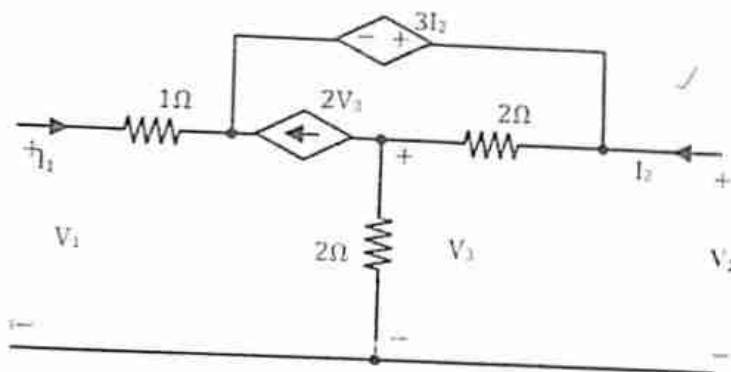
B) A series RLC circuit has  $R = 10 \text{ ohm}$ ,  $L = 1 \text{ H}$ ,  $C = 20 \text{ micro F}$ . A  $100 \text{ V}$ ,  $50 \text{ Hz}$  supply is applied across the circuit. Find the input current and voltage across the elements.

4) A) Calculate  $h$  parameters and proof weather the circuit is a symmetrical or reciprocity.

(2x5)



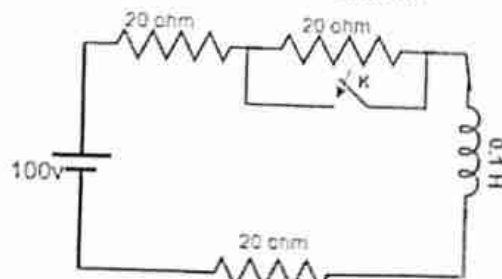
B) Calculate  $Y$  parameters.



5) A) Derive transient response of series RL circuit for source and source-free response with all the graphs and equations.

(2x5)

B) A d.c. voltage of  $100 \text{ v}$  is applied in the circuit and the switch  $K$  is open. The switch  $K$  is closed at  $t = 0$ . Find the complete expression for the current.



$$V_1 = Z_{11} I_1 + Z_{12} I_2$$

$$(Z_{11} Z_{22} - Z_{12} Z_{21}) I_1 + Z_{12} I_2$$

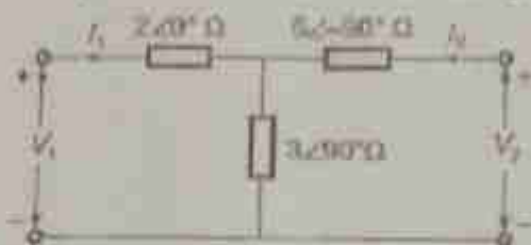


B) A heater takes 10 Amp at 50 V. calculate the impedance of a choke of 5 ohm resistor to be placed in series with it in order that it may work at 200 V, 50 Hz supply. (4)

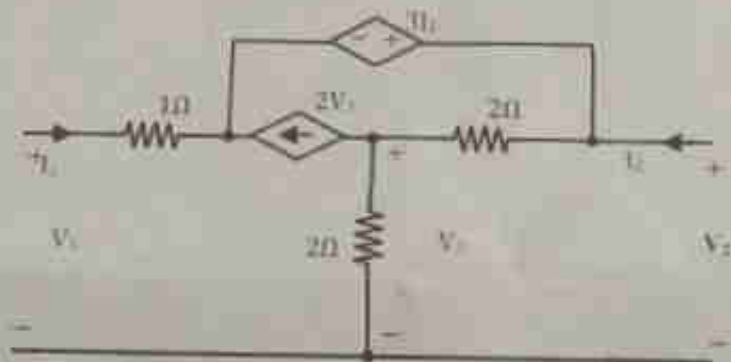
4) A) Derive the Resonance condition for series RLC circuit. (4)

B) Derive Kirchhoff's Laws. (4)

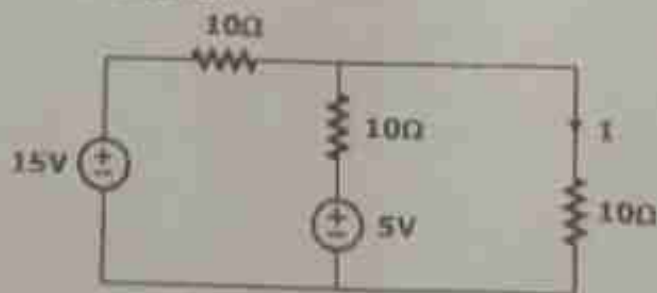
5) A) Calculate Z parameters and proof weather the circuit is a symmetrical or reciprocity. (4)



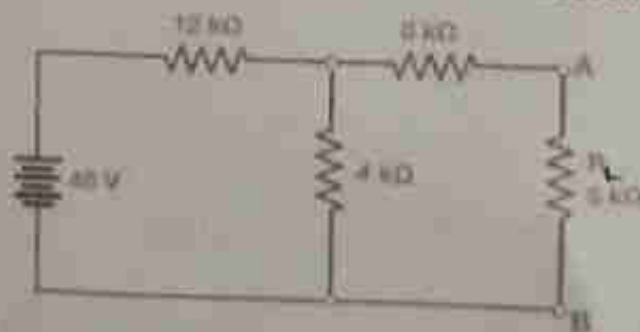
B) Calculate Y parameters. (4)



6) A) Find I using superposition Theorem. (4)



B) Find voltage drop across  $R_L$  using Thevenin's and Norton's Theorem. (6)







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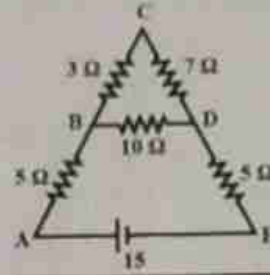
Total Marks: 30

Date: 05 October, 2023

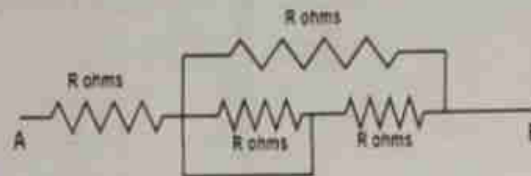
**Instruction**

- Attempt all questions. All question carries equal marks.

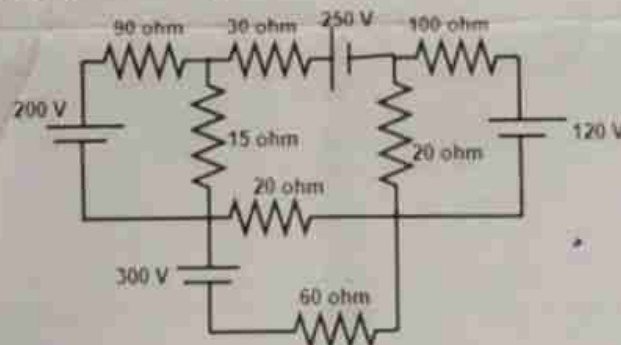
- 1) A) Find the equivalent resistance across the terminal A and E. (2×3)



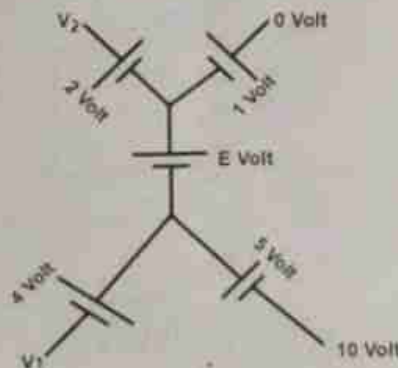
- B) Find the equivalent resistance across the terminal A and B.



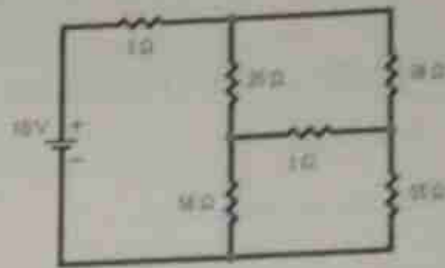
- 2) A) Using Nodal method, find the voltage at each unknown node. (2×3)



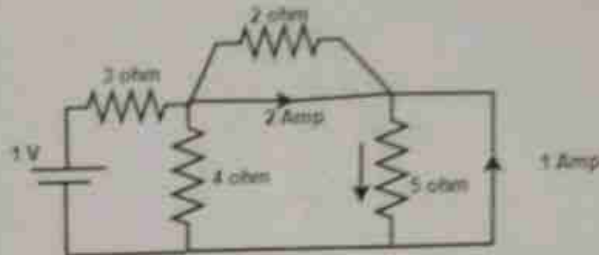
- B) In the circuit of the figure, the value of the voltage source E is.



- 3) A) Find the current flowing in each branch of this circuit. (2×3)

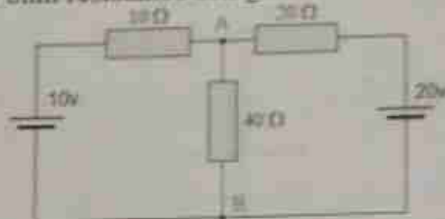


B) Determine the current through 5 ohm resistance using source transform method.

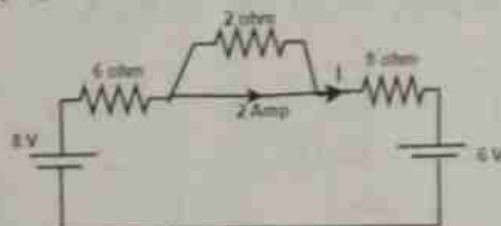


4) A). Find voltage across 40 ohm resistance using Thevni's Theorem.

(2 × 3)

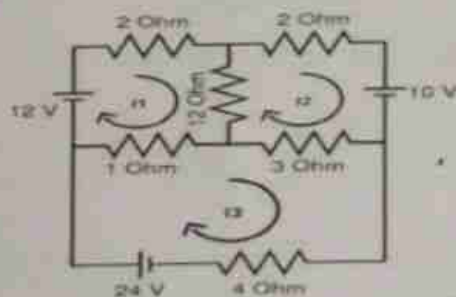


B) Find Current I using superposition Theorem.



5) A) Find the current through 4 ohm resistance.

(2 × 3)



B) Find the current I using KCL.

