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[No. of Printed Pages – 4]

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ES103

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END SEMESTER EXAMINATION : JANUARY, 2025

BASIC ELECTRICAL ENGINEERING

Time : 3 Hrs. *Maximum Marks : 60*

Note: ***Attempt questions from all sections as directed. Use of scientific calculators is allowed.***

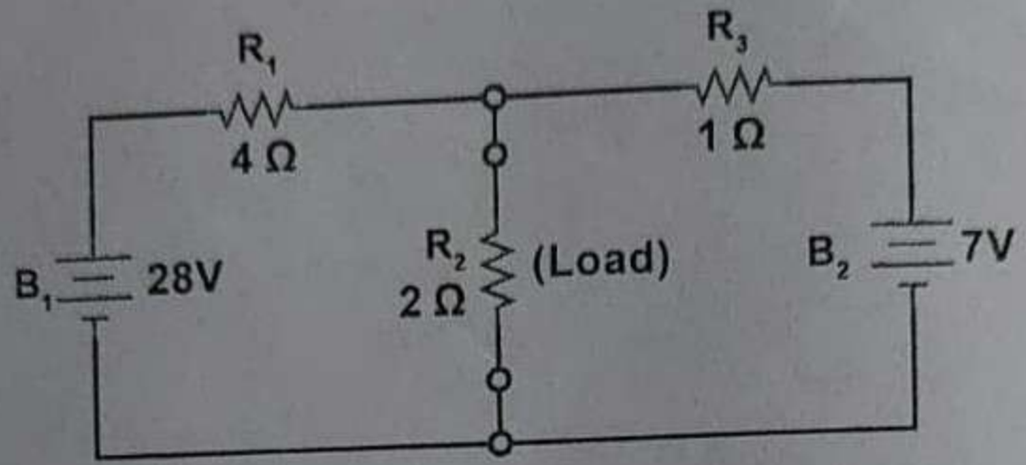
SECTION – A (24 Marks)

Attempt any **four** *questions out of* **five**.

Each question carries **06** *marks.*

1. State and explain Thevnin theorem. Find current in the load resistance of the circuit shown in the figure below using Thevnin theorem.

P.T.O.



2. A single phase R-L series circuit consists of a resistance of 20 Ω and inductance of 0.1 H. A voltage of 240 V, 50 Hz is applied to this circuit. Find current in the circuit. Also find power consumed by the circuit and power factor of the circuit. Draw the phasor diagram.

3. Discuss the advantages, limitations and applications of PMMC and moving iron types of measuring instruments.

4. Two wattmeters connected to measure the total power in a 3-phase balanced circuit. One measures 4800W, while the other reads backwards. On reversing the latter it is found to read 400W. What is the total power and power factor?

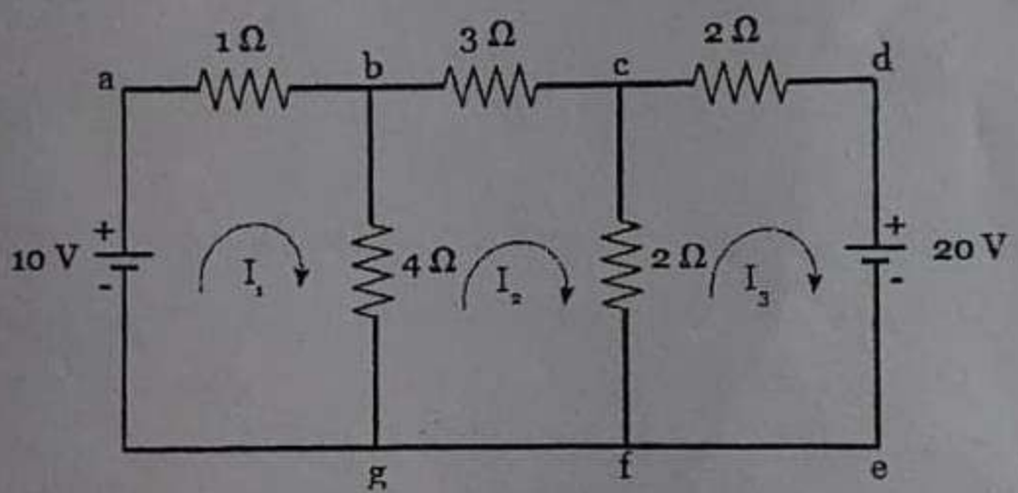
5. Describe briefly the operation of a single phase transformer. Derive the expression for the induced emf of a transformer.

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three.**

Each question carries **10** *marks.*

6. State Norton's theorem for a dc network. In the circuit shown in the figure below, determine the currents i_1 and i_2 and i_3 using mesh current method.



7. A sinusoidally varying alternating current of frequency 60Hz has a maximum value of 15 amperes.

(i) Write down the equation for instantaneous value

(ii) Find the value of current after 1/200 second

(iii) Find the time taken to reach 10 amperes for the first time and

(iv) Find its average value.

8. (a) A PMMC instrument gives a reading of 25mA when the potential difference across its terminals is 75mV. Calculate shunt resistance for full scale deflection corresponding to 50A. (8)

(b) State and briefly explain Superposition theorem for a dc network. (2)

SECTION – C (16 Marks)

(Compulsory)

9. (a) Draw a circuit diagramfor the measurement of power in 3 phase circuits by using two and wattmeter methods. Derive the expressions for the wattmeter readings. (8)

(b) Describe the construction and working of a transformer. A single phase transformer has a core whose cross-sectional area is 150 cm2; operates at a maximum flux density of 1.1 Wb/m2 from a 50Hz supply. If the secondary winding has 66 turns, determine the output in KVA when connected to a load of 42 impedance. Neglect any voltage drop in the transformer. (8)