Reg. No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2023

First Semester

EE22152 – BASIC ELECTRICAL ENGINEERING

*(Electronics and Communication Engineering)*

(Regulation 2022)

TIME: 3 HOURS   **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Analyze DC and AC electrical circuits using Kirchoff's law.	4
CO 2	Explain the working principle of electrical machines	4
CO 3	Choose the appropriate electrical machines for various applications.	4
CO 4	Understand the principles of electrical machines and power converters.	4
CO 5	Explain the types and operating principle of measuring instruments.	4

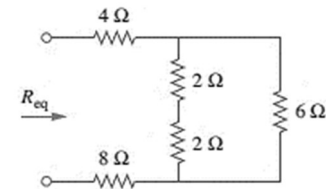### PART- A (20 x 2 = 40 Marks)

(Answer all Questions)

		CO	RBT LEVEL

1.
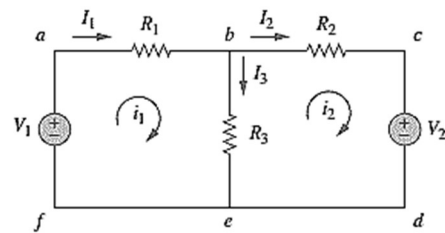
Express the KVL equations for the given circuit. — 1 — 3

2. Compare the two network reduction rules with necessary formulas. — 1 — 2

3.

Solve the given circuit to determine Req. — 1 — 3

4. Show the phasor diagram of Power and define Power Factor. — 1 — 3

5. Outline the assumptions considered for an ideal transformer. — 2 — 2

6. Compare the Step Up and Step Down Transformer in terms of its Ampere Turn Ratio. — 2 — 2

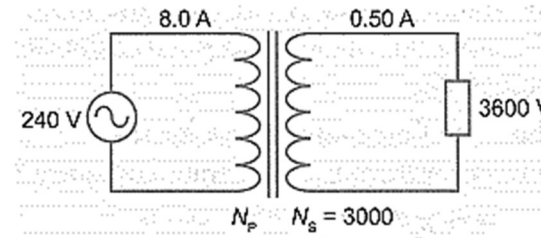**7.** Justify why the induced emf in a dc motor is called back or counter emf. — 2 — 2

8.

Calculate the efficiency of the transformer. — 2 — 3

9. Why Single Phase Induction Motor is not Self Starting? — 3 — 2

10. Show the relation between phase and line current and phase and line voltage of the star connected balanced system. — 3 — 2

11. A 12- pole, 50 Hz, three phase induction motor runs at 500 rpm. Calculate the synchronous speed. — 3 — 3

12. Differentiate between squirrel cage rotor and slip ring rotor. — 3 — 3

13. Distinguish between MCB and MCCB. — 4 — 3

14. Compute the energy consumption in a system that consumes 250 Watts of power and works for 6 hrs a day. — 4 — 3

15. Sketch the circuit diagram of buck converter and boost converter. — 4 — 3

16. What is the necessity of fuse in the electrical circuit? — 4 — 2

17. Calculate the value of the shunt resistance required to convert a 1-mA meter movement, with a 100-ohm internal resistance, into a 0- to 10-mA ammeter? — 5 — 3

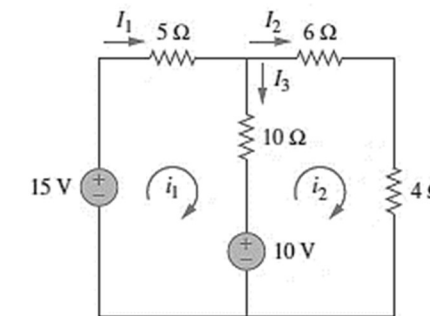**18.** Classify secondary instruments with an example for each. — 5 — 2

19. Which torque is absent in energy meter? — 5 — 3

20. Describe the significance of net metering. — 5 — 2

PART- B (5 x 10 = 50 Marks)

	Marks	CO	RBT LEVEL

21. (a)

For the circuit shown, find the branch currents I_1, I_2, and I_3 using mesh analysis. — (10) — 1 — 4

(OR)

(b)
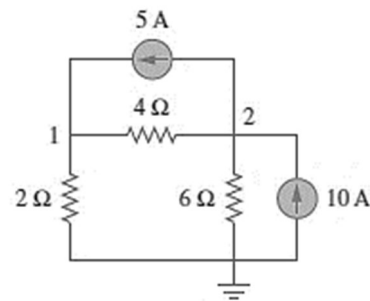
Calculate the nodal voltages for the circuit shown in figure.

| | | | | (10) | 1 | 4 |

22. (a) A single phase 50-Hz transformer has 20 primary turns and 200 secondary turns. If the primary winding is connected to a 230V supply, calculate (i) The value of maximum core flux (ii) The voltage induced in the secondary winding (iii) the primary current when the secondary current is 13A.   **(10)**   **2**   **3**

(OR)

(b) **(i)** Derive the Torque – Speed characteristics of dc motor.   **(6)**   **2**   **3**

(ii) Discuss the speed control method used of separately excited dc motor.   **(4)**   **2**   **3**

23. (a) **(i)** Draw a typical torque-slip characteristics curve and deduce the condition for maximum torque.   **(6)**   **3**   **3**

(ii) Show that the three-phase currents flowing in three phase windings generate a rotating magnetic field.   **(4)**   **3**   **3**

(OR)

(b) **(i)** Explain construction and working principle of Synchronous Generator.   **(6)**   **3**   **3**

(ii) Discuss the various types of losses that can occur in an induction motor.   **(4)**   **3**   **3**

24. (a) Draw the circuit diagram of a buck boost converter and explain its operation with equivalent circuit for different modes and waveforms.   **(10)**   **4**   **3**

(OR)

(b) Briefly explain the components of LT Switchgear and its types.   **(10)**   **4**   **3**

25. (a) Explain construction and working principle of PMMC instrument.   **(10)**   **5**   **2**
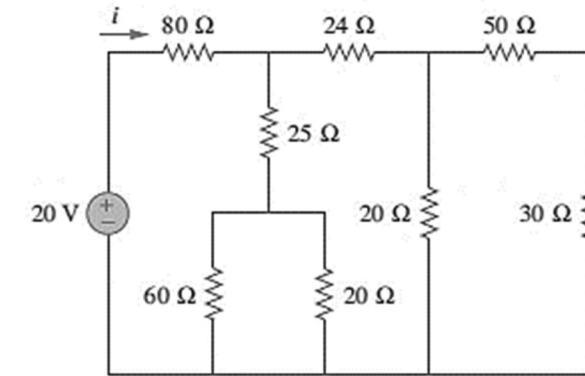
(OR)

(b) With the neat sketch explain the construction and operation of repulsion and attraction type moving iron instrument.   **(10)**   **5**   **2**

PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

	Marks	CO	RBT LEVEL

26.

Evaluate the current i flowing in the circuit shown.

| | | (10) | 1 | 5 |

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