B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025
Second Semester
Mechanical Engineering
20ESEE201 - ELECTRICAL TECHNOLOGY WITH LABORATORY
Regulations - 2020

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)
Answer ALL Questions

|		Marks	K–Level	CO
1.	Ohm's law states the relationship between	1	K1	CO1
	(a) Voltage and frequency (b) Voltage and resistance			
	(c) Voltage, current, and resistance (d) Current and frequency			
2.	Thevenin's theorem simplifies a circuit into	1	K1	CO1
	(a) A current source and a resistor in series			
	(b) A voltage source and a resistor in series			
	(c) A current source and a resistor in parallel			
	(d) A voltage source and a resistor in parallel			
3.	The core material of a transformer is typically made of	1	K1	CO2
	(a) Copper (b) Iron (c) Aluminum (d) Silicon			
4.	The torque produced by a DC motor is directly proportional to	1	K1	CO2
	(a) The square of the armature current (b) The armature current			
	(c) The magnetic flux (d) The square of the magnetic flux			
5.	The rotor of a synchronous machine typically consists of	1	K1	CO3
	(a) Commutators (b) Field windings (c) Permanent magnets (d) Brushes			
6.	If a single-phase induction motor has a slip of 5% and the synchronous speed is 1440 RPM, the rotor speed will be	1	K2	CO3
	(a) 1512 RPM (b) 1368 RPM (c) 1440 RPM (d) 1000 RPM			
7.	The primary purpose of using a starter for DC motors is to	1	K1	CO4
	(a) Control speed (b) Protect the motor from high starting current			
	(c) Regulate voltage (d) Increase motor efficiency			
8.	Electrical braking in a motor is preferred because	1	K1	CO4
	(a) It is less expensive than mechanical braking			
	(b) It prevents wear and tear on mechanical parts			
	(c) It increases the speed of the motor			
	(d) It improves efficiency			
9.	The basic elements of an electric drive system include	1	K1	CO5
	(a) Motor, load, power supply, and controller			
	(b) Motor, transformer, power supply, and inverter			
	(c) Load, generator, power supply, and governor			
	(d) Battery, load, motor, and sensors			
10.	What is the most common type of starter used for small DC motors?	1	K1	CO6
	(a) Rheostat starter (b) Star-delta starter			
	(c) Auto-transformer starter (d) Ward-Leonard starter			

PART - B (12 × 2 = 24 Marks)
Answer ALL Questions

		Marks	K–Level	CO
11.	What is Kirchhoff's Voltage Law?	2	K1	CO1
12.	Explain the concept of power factor.	2	K2	CO1
13.	State the principle of operation of a transformer.	2	K1	CO2
14.	Infer the importance of insulation in transformer construction.	2	K2	CO2

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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15. What is the primary function of the rotor in a three-phase induction motor?	2	K1 CO3
16. How does the construction of a squirrel cage rotor differ from a slip ring rotor?	2	K1 CO3
17. Why is a starter necessary for a D.C. motor?	2	K1 CO4
18. What is the significance of electrical braking in industrial applications?	2	K1 CO4
19. Define electric drive.	2	K1 CO5
20. Name the different types of electric drives used in industrial applications.	2	K1 CO5
21. Name the types of DC motor starters.	2	K1 CO6
22. List types of AC motor Starter.	2	K1 CO6

PART - C (6 × 11 = 66 Marks)
Answer ALL Questions

23. a) Solve the Loop currents I_1, I_2 and I_3 by Mesh loop analysis as shown in Fig.   *11*   K3   CO1
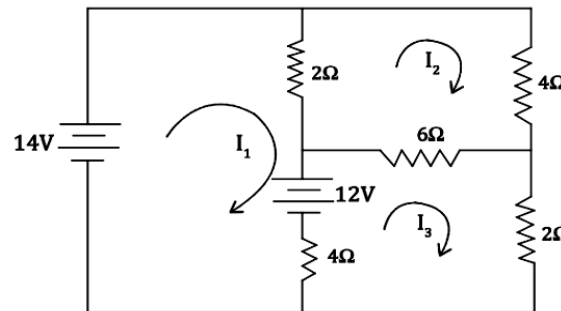
OR

b) Utilize Thevenin's theorem, Solve the current through R_L=10 Ohm as shown in Fig. and Find power developed by Load.   *11*   K3   CO1
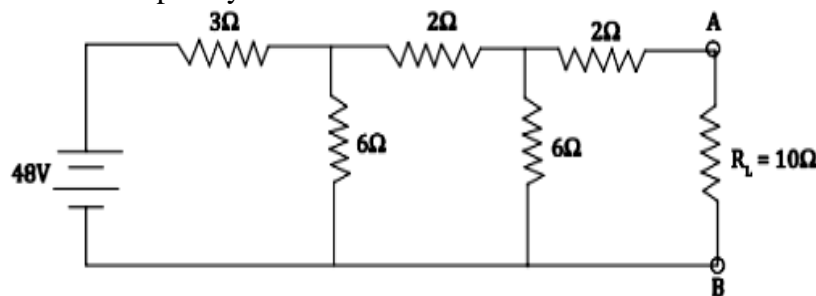
24. a) Develop a schematic diagram illustrating the construction of a D.C. motor.   *11*   K3   CO2

OR

b) Construct a detailed analysis of the EMF equation of transformers.   *11*   K3   CO2

25. a) Construct a detailed and operational principle of synchronous machines.   *11*   K3   CO3

OR

b) Identify the characteristics of three-phase induction motors.   *11*   K3   CO3

26. a) Explain in detail about three-point starter.   *11*   K2   CO4

OR

b) Explain in detail about any two types of AC starters which is used in SQIM.   *11*   K2   CO4

27. a) Organize about the factors influencing the choice of electrical drives.   *11*   K3   CO5

OR

b) Develop an expression for temperature rise time curve.   *11*   K3   CO5

28. a) Explain the method of regenerative and dynamic braking of DC Motor.   *11*   K2   CO6

OR

b) Illustrate the rotor rheostat control of 3 phase slip ring induction motor.   *11*   K2   CO6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create