Reg. No.																

Question Paper Code	13023

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Second Semester

Mechanical Engineering

(Common to Mechanical and Automation Engineering)

20ESEE201 - ELECTRICAL TECHNOLOGY WITH LABORATORY

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	In a series circuit, the current is: (a) same at all points (b) Divided among components (c) Maximum at the load (d) Zero at the Source	1	K1	CO1
2.	If the resistance in a circuit is doubled, the current will: (a) Double (b) Halve (c) Stay the same (d) Quadruple	1	K1	CO1
3.	Which of the following components is used to store electrical energy in an electric field? (a)Resistor (b) Inductor (c) Capacitor (d) Diode	1	K1	CO1
4.	In a DC circuit, if the current is increasing, the inductor will: (a) Store more Energy (b) Resist changes in current (c) Short-circuit (d) Increase the voltage cross it	1	K1	CO2
5.	A 12V battery is connected in a series with 4 ohm resistor. what is current flowing through the circuit? (a) 3 A (b) 4A (c) 6A (d) 12 A	1	K1	CO2
6.	An Ac current differs from DC current in that: (a) The voltage is constant (b) the direction of the current changes periodically (c) the current flows in only one direction (d) the frequency is always constant	1	K1	CO2
7.	The reactance of the capacitor at high frequency is (a) High (b) Low (c) Zero (d) Infinite	1	K1	CO3
8.	Which type of transformer is used to step up the voltage? (a) Step-up transformer (b) Step-down transformer (c) Isolation transformer (d) Auto-transformer	1	K1	CO3
9.	What is the primary function of a commutator in a DC machine? (a) To change the direction of current in the armature winding (b) To reduce energy losses (c) To regulate voltage (d) To store energy	1	K1	CO3
10.	In an induction motor, the rotor speed is: (a) Always equal to the synchronous speed (b) Always less than the synchronous speed (c) Always greater than the synchronous speed (d) It is not related to the synchronous speed	1	K1	CO4
11.	If the load on an induction motor increases, what happens to the slip? (a) The slip decreases (b) The slip increases (c) The slip remains constant (d) The motor stops	1	K1	CO4
12.	In a closed loop control system for an electric drive, the feedback signal is used to (a) Control the voltage (b) Maintain the desired speed and torque (c) Mointor the current (d) Start and Stop the motor	1	K1	CO4

13.	Which type of electric drive would be most suitable for an elevator system where smooth speed control and high efficiency are important? (a) DC drive (b) Induction motor drive with V/f control (c) Synchronous motor drive (d) Universal motor drive	*1*	*K1*	*CO5*
14.	Which of the following is a characteristic of a VFD? (a) It can control both speed and torque (b) It can control both torque (c) It can control both (d) It is used only for D motors	*1*	*K1*	*CO5*
15.	In an Induction motor drive, speed control can be achieved by varying: (a) Frequency of the supply voltage (b) voltage applied to the motor (c) Rotor Resistance (d) Both a and b	*1*	*K1*	*CO5*
16.	In a DC motor Drive , the speed is primarily controlled by varying the (a) armature current (b) field current (c) supply voltage (d) both field and armature current	*1*	*K1*	*CO5*
17.	The main advantage of a shunt-wound DC motor is: (a) High starting torque (b) Constant speed under varying loads (c) Simplicity and low cost (d) High efficiency at all loads	*1*	*K1*	*CO6*
18.	The back EMF (electromotive force) in a DC motor: (a) Increases with the increase in load (b) Is directly proportional to the armature current (c) Opposes the applied voltage and limits the current (d) Has no impact on motor operation	*1*	*K1*	*CO6*
19.	In which of the following conditions does an induction motor run at synchronous speed? (a) When the motor is under full load (b) When there is no load on the motor (c) When the motor is under no load condition (i.e., idle) (d) An induction motor cannot run at synchronous speed	*1*	*K1*	*CO6*
20.	Which of the following is a disadvantage of using a Direct-on-Line (DOL) starter for an AC motor? (a) High starting torque (b) High starting current that may damage the motor (c) Low operational cost (d) Reduced mechanical stress on the motor	*1*	*K1*	*CO6*

PART - B (10 × 2 = 20 Marks)

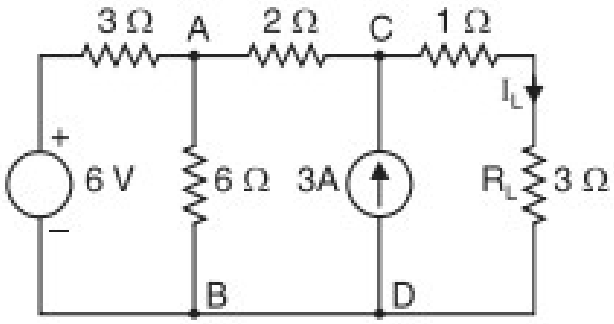
Answer ALL Questions

21.	Define Thevenin's Theorem.	*2*	*K1*	*CO1*
22.	A 150 V lamp has a hot resistance of 50 Ω. Find the current taken by the lamp and its power rating in watts. Find the energy it will consume in 12 hours.	*2*	*K2*	*CO1*
23.	What is loop and mesh?	*2*	*K1*	*CO2*
24.	Define the Superposition Theorem.	*2*	*K1*	*CO2*
25.	What is the principle of DC motor?	*2*	*K1*	*CO3*
26.	Select the EMF equation of transformer.	*2*	*K1*	*CO3*
27.	Explain the working principle of a three phase induction motor.	*2*	*K2*	*CO4*
28.	List the types of synchronous motor.	*2*	*K1*	*CO4*
29.	Choose the various classes of duty for an electric motor.	*2*	*K1*	*CO5*
30.	Classify the types of AC motor Starter.	*2*	*K2*	*CO6*

PART - C (6 × 10 = 60 Marks)

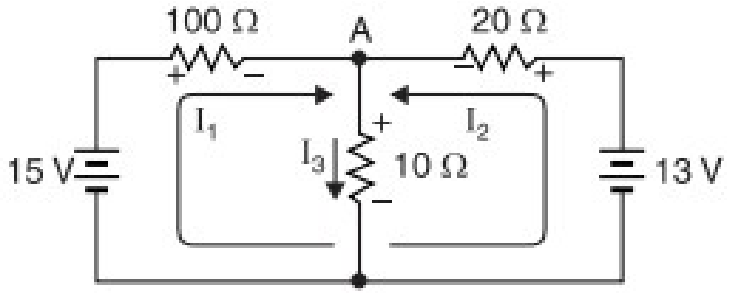
Answer ALL Questions

31.	a)	Make use of source conversion technique, find the load current IL in the circuit shown in Fig.	*10*	*K3*	*CO1*

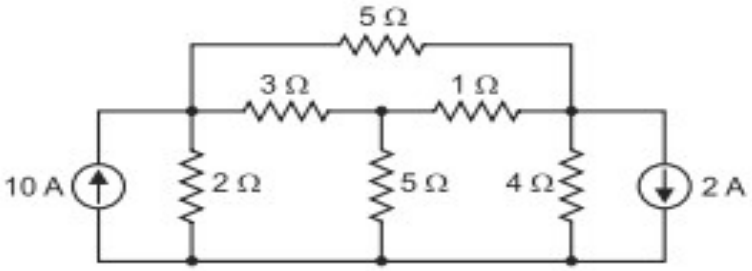


OR

b) Solve the current in various resistors in the circuit shown in fig. by converting voltage sources into current sources. *10 K3 CO1*

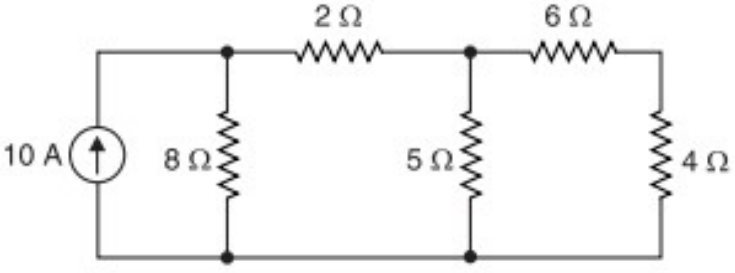


32. a) Solve the currents in various branches by using nodal analysis. *10 K3 CO2*



OR

b) Choose the Norton's theorem to find the current in the 5 ohm resistor in the circuit shown. *10 K3 CO2*



33. a) Develop the torque equation of DC motor. *10 K3 CO3*

OR

b) Construct the various types of DC motors with suitable diagrams. *10 K3 CO3*

34. a) A three phase 50Hz induction motor runs almost at 960 rpm on full load, when supplied with three phase supply. Calculate the following (i) Number of poles (ii) Full load slip (iii) Frequency of rotor emf (iv) Speed of motor at 8 percent slip. *10 K3 CO4*

OR

	b)	Build the construction and working of single phase induction motor.	*10*	*K3*	*CO4*
35.	a)	Explain different types of electric drive and the factors affecting selection of drives.	*10*	*K2*	*CO5*
		OR			
	b)	Contrast the method of estimating equivalent continuous power rating of a motor for short time load Applications.	*10*	*K2*	*CO5*
36.	a)	Illustrate the rotor rheostat control of 3 phase slip ring induction motor.	*10*	*K2*	*CO6*
		OR			
	b)	Explain the method of regenerative and dynamic braking of DC Motor.	*10*	*K2*	*CO6*