Q. Code:456046

Reg. No. | | | | | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2024

First Semester

EE22152 – BASIC ELECTRICAL ENGINEERING

(Electronics and Communication Engineering)

(Regulation 2022)

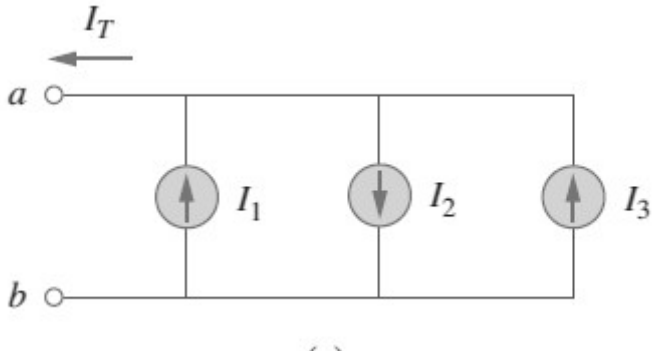
TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Analyze DC and AC electrical circuits using Kirchhoff'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	To introduce the components of low voltage electrical installations and the working principles of Power converters.	**4**
CO 5	To study the different types of measuring instruments.	**4**

PART- A (20 x 2 = 40 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Estimate the current I_T given I_1=-3A, I_2=6A, I_3=10A.	**1**	**2**



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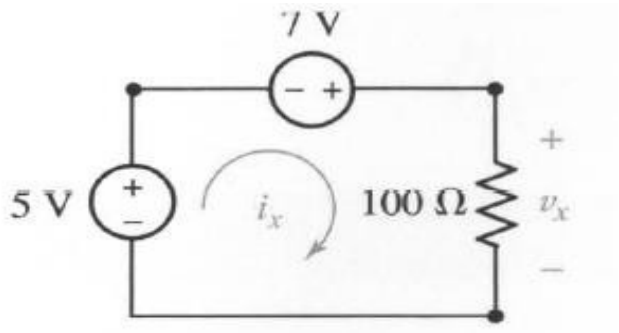
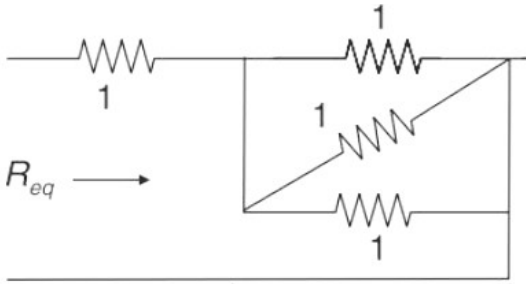
2.	Solve the given circuit to determine i_X.	**1**	**2**



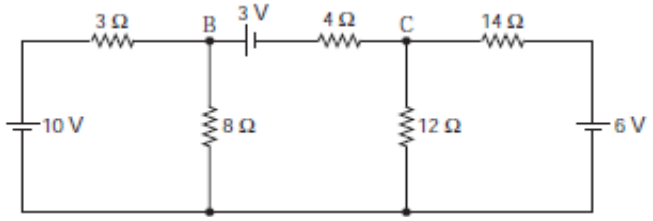
3.	Summarize the formulas required for converting star network to delta network.	**1**	**2**
4.	All resistances in the figure are in ohms. Calculate the value of equivalent resistance Req.	**1**	**2**



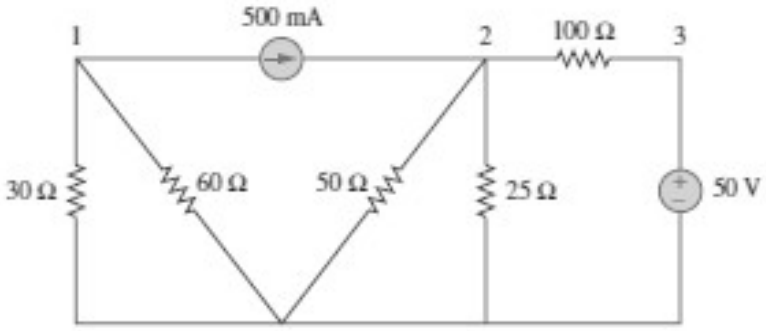
5.	What is back EMF and what is its impact on motor operation.	**2**	**2**
6.	A DC motor has a torque constant Kt of 0.1 Nm/A. If the armature current is 5 A, calculate the torque produced by the motor.	**2**	**2**
7.	Draw the equivalent circuit of a practical transformer.	**2**	**2**
8.	List out the major and minor losses in a transformer.	**2**	**2**
9.	What are the advantages of three phase system over single phase system.	**3**	**2**
10.	How will you find the speed of an ac machine with given frequency and poles? Justify.	**3**	**3**
11.	A 2-pole generator rotor runs at 3600 rpm. Find the electrical frequency of the generated signal.	**3**	**3**
12.	A 12- pole, 50 Hz, three phase induction motor runs at 485rpm. What is the frequency of rotor current?	**3**	**3**
13.	Express the necessity of a fuse in an electrical circuit.	**4**	**3**
14.	Distinguish between MCB and MCCB.	**4**	**2**
15.	Cite the properties of electrical cable.	**4**	**2**
16.	Compute the energy consumption of a system that consumes 190 Watts of power and works for 3 hours a day.	**4**	**3**
17.	Show the figure of a Moving Iron instrument when it is used as a voltmeter and an ammeter.	**5**	**2**
18.	Classify the types of analog meter.	**5**	**2**
19.	Represent the secondary instrument and its types.	**5**	**2**
20.	Indicate the torque is absent in the energy meter. State the reason.	**5**	**3**

PART- B (5 x 10 = 50 Marks)

		Marks	CO	RBT LEVEL
21. (a)	Analyze the circuit to find the mesh currents using Cramer's method and calculate the current through the 8Ω resistor.	**(10)**	**1**	**4**



(OR)

(b) 

(10) 1 4

Calculate the nodal voltages. Examine the ckt find out node voltages.

22. (a) Draw the circuit of separately excited DC motor. And also explain its construction and working. **(10) 2 4**

(OR)

(b) Explain the torque- speed characteristics and speed control of separately excited DC motor. **(10) 2 4**

23. (a) How the RMF is generated in the three-phase induction motor? Explain the construction and working of three phase Induction Motor. **(10) 3 4**

(OR)

(b) Compare the Induction motor and generator. Also explain the construction and working the synchronous generator? **(10) 3 4**

24. (a) Construct the buck-boost converter and explain its operation with an 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) With the neat sketch, explain the construction and operation of repulsion and attraction type moving iron instruments. **(10) 5 4**

(OR)

(b) **(i)** The coil of a measuring instrument has a resistance of 1 Ω, and the **(7) 5 4**

instrument has a full scale deflection of 250 V when a resistance of 4999 Ω is connected with it. Find the current range of the instrument when used as an ammeter with the coil connected across a shunt of (1/499) Ω and determine the value of the shunt resistance required for the instrument to display a full scale deflection of 50 A

(ii)	Analyze the PMMC instrument with neat diagram.	**(3)**	**5**	**4**

PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	A three -phase 6-pole, 50 Hz induction motor has a slip of 1% at no load and 3% at full load. Find (a)the synchronous speed, (b) the no -load speed, (c) the full- load speed, (d) the frequency of rotor-currents at standstill, and (e)the frequency of rotor-currents at full load.	**(10)**	**2**	**5**

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