COEP TECHNOLOGICAL UNIVERSITY, PUNE
(A Unitary Public University of Government of Maharashtra.)

END Semester Examination

Programme: B. Tech

Course Code: EE-19002

Branch: Mechanical Group

Duration: 3 Hrs
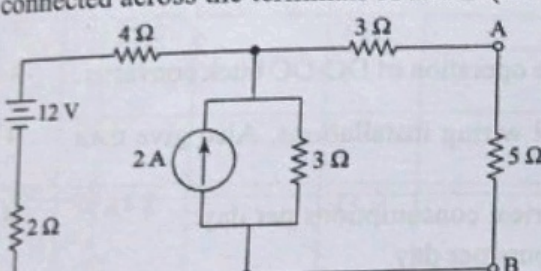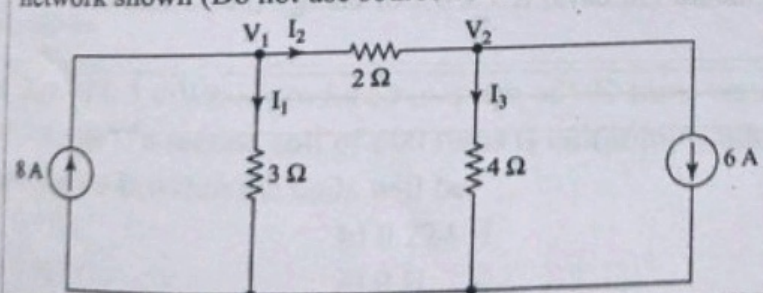
Student PRN No.

Semester: I
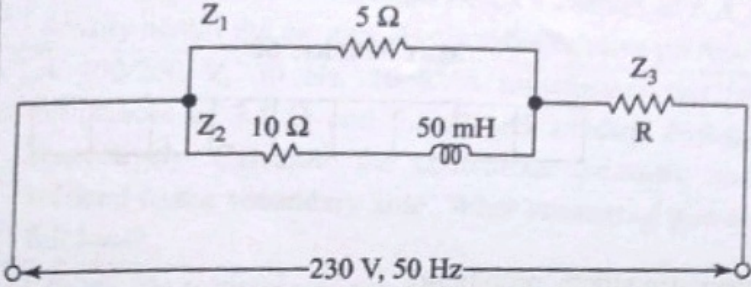
Course Name: BEE

Academic Year: 2022-23

Max Marks: 60

Instructions:

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of stationery, calculator etc. is not allowed.
5. Write your PRN Number on Question Paper.

			Marks	CO
Q1	a)	Use Norton's theorem to calculate the current flowing through the 5 Ω resistor connected across the terminals A and B (Do not use source conversion technique).	6	1
	b)	Using nodal analysis calculate the current flowing through all the branches in the network shown (Do not use source conversion technique).	6	1
Q2	a)	An alternating voltage, $V = (160 + j170)$ V is connected across an L–R series circuit. A current of $I = (12 - j5)$ A flows through the circuit. Calculate impedance, power factor, and power consumed. Draw the phasor diagram.	6	1

	b)	A three-phase star-connected load consumes a total of 12 kW at a power factor of 0.8 lagging when connected to a 400 V, three-phase, 50 Hz power supply. Calculate the resistance and inductance of load per phase.	6	1
Q3	a)	What should be the value of R for which a current of 25 A will flow through it in the circuit shown.	6	1

Z_1 5 Ω

Z_3

Z_2 10 Ω   50 mH   R

——— 230 V, 50 Hz ———

	b)	The air gap of a magnetic circuit is 2 mm long and 25 cm^2 in cross section. Calculate the reluctance of the air gap. How much ampere turns will be required to produce a flux of 1.2 mWb in the air gap?	6	2
Q4	a)	A 25 kVA, 2000/200 V transformer has iron loss of 350 W and full-load copper loss of 400 W. Calculate the efficiency of the transformer at full load unity power factor and at half load 0.8 lagging power factor.	6	2
	b)	Draw schematic diagrams of DC shunt, DC series and DC compound motors and mention their applications.	6	3
Q5	a)	With the help of a neat circuit diagram, explain the operation of DC-DC buck converter.	4	3
	b)	Explain the use of MCB and ELCB in electrical wiring installations. Also give their typical specifications.	4	4
	c)	A residential flat has the following average electrical consumptions per day: 1) 4 tube lights of 40 watts working for 5 hours per day. 2) 1 water heater rated 2 kW working for 1 hour per day. 3) 1 water pump of 0.5 kW rating working for 3 hours per day. Calculate the cost of energy per month (30 days) if 1 kWh of energy (i.e., 1 unit of energy) costs Rs. 5.	4	4

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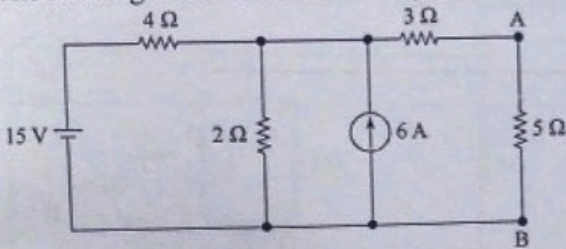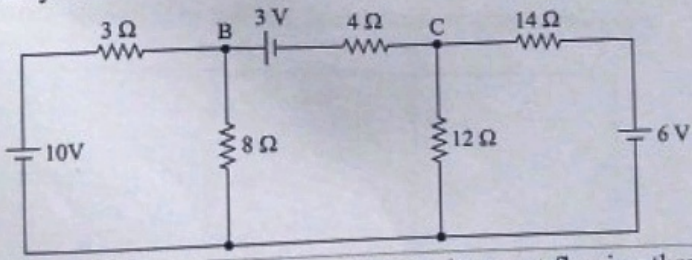
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Course Code: EE-19002

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			Marks	CO
Q1	a)	Calculate the current flowing through the 5 Ω resistor connected across the terminals A and B using Thevenin's theorem (Do not use source conversion technique).	6	1
	b)	For the circuit shown, determine the current through 8 Ω and 12 Ω resistors using Nodal analysis.	6	1
Q2	a)	The expression of applied voltage and current flowing through an ac series R–L circuit are: $v = 200 \sin\left(314t + \frac{\pi}{3}\right)$ and $i = 20 \sin\left(314t + \frac{\pi}{6}\right)$ Calculate the (i) Resistance (ii) inductance (iii) power factor; (iv) active power (v) reactive power and (vi) apparent power.	6	1

Q1 a) circuit:

4 Ω, 3 Ω, A, 15 V, 2 Ω, 6 A, 5 Ω, B

Q1 b) circuit:

3 Ω, B, 3 V, 4 Ω, C, 14 Ω, 10V, 8 Ω, 12 Ω, 6 V

	b)	Two impedances, $Z_1 = 12\angle 30^0$ and $Z_2 = 8\angle -30^0$ are connected in parallel across a 230 V, 50 Hz supply. Calculate the total admittance, equivalent impedance, total current, power factor, and power consumed by the whole circuit.	6	1
Q3	a)	Three identical coils are connected in star across a three-phase 415 V, 50 Hz supply. The total power drawn is 3 kW at a power factor of 0.3. Calculate the resistance and inductance of each coil.	6	1
	b)	An iron ring of mean length 50 cm has an air gap of 1 mm. The ring is provided with a winding of 200 turns through which a current of 1 A is allowed to flow. Find the flux density across the air gap. Assume the relative permeability of iron as 300.	6	2
Q4	a)	A 400/200 V, 50 Hz, 10 kVA transformer has primary and secondary winding resistances of 2.5 Ω and 0.5 Ω and winding leakage reactances of 5 Ω and 1 Ω, respectively. Calculate the equivalent resistance and reactance of the transformer referred to the secondary side. What amount of power will be lost in the windings at full load?	6	2
	b)	Explain the principle of working of a three-phase induction motor. What are the two main types of three-phase induction motor? Also mention their applications.	6	3
Q5	a)	With the help of a neat circuit diagram, explain the operation of single-phase voltage source inverter.	4	3
	b)	What is the function of switch fuse unit? State any two advantages and disadvantages of fuses.	4	4
	c)	Draw a neat diagram of fluorescent lamp circuit and state the function of each component in brief.	4	4

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END Semester Examination

Programme: B. Tech

Course Code: EE-19002

Branch: Mechanical Group

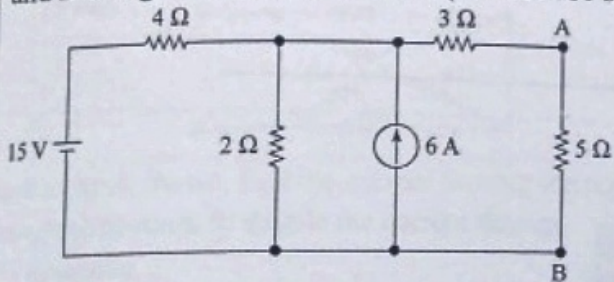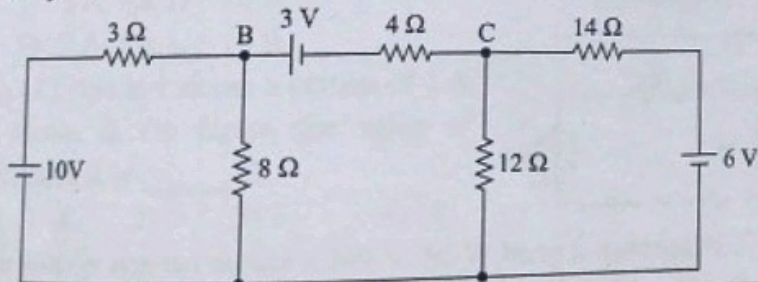Duration: 3 Hrs

Student PRN No.

Semester: I

Course Name: BEE

Academic Year: 2022-23

Max Marks: 60

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	b)	For the circuit shown, determine the current through 8 Ω and 12 Ω resistors using Nodal analysis.	6	1
Q2	a)	The expression of applied voltage and current flowing through an ac series R–L circuit are: $v = 200 \sin\left(314t + \frac{\pi}{3}\right)$ and $i = 20 \sin\left(314t + \frac{\pi}{6}\right)$ Calculate the (i) Resistance (ii) inductance (iii) power factor; (iv) active power (v) reactive power and (vi) apparent power.	6	1

	b)	Two impedances, $Z_1 = 12\angle30^0$ and $Z_2 = 8\angle-30^0$ are connected in parallel across a 230 V, 50 Hz supply. Calculate the total admittance, equivalent impedance, total current, power factor, and power consumed by the whole circuit.	6	1
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	b)	An iron ring of mean length 50 cm has an air gap of 1 mm. The ring is provided with a winding of 200 turns through which a current of 1 A is allowed to flow. Find the flux density across the air gap. Assume the relative permeability of iron as 300.	6	2
Q4	a)	A 400/200 V, 50 Hz, 10 kVA transformer has primary and secondary winding resistances of 2.5 Ω and 0.5 Ω and winding leakage reactances of 5 Ω and 1 Ω, respectively. Calculate the equivalent resistance and reactance of the transformer referred to the secondary side. What amount of power will be lost in the windings at full load?	6	2
	b)	Explain the principle of working of a three-phase induction motor. What are the two main types of three-phase induction motor? Also mention their applications.	6	3
Q5	a)	With the help of a neat circuit diagram, explain the operation of single-phase voltage source inverter.	4	3
	b)	What is the function of switch fuse unit? State any two advantages and disadvantages of fuses.	4	4
	c)	Draw a neat diagram of fluorescent lamp circuit and state the function of each component in brief.	4	4

END Semester Examination

Programme: B. Tech./B. Plan./M. Tech./M. Plan/MBA

Course Code: EE-19002

Branch: Electrical Group

Duration: 3 Hours

Student PRN No.

Semester: II

Course Name: Basic Electrical Engg.

Academic Year: 2022-23

Max Marks: 60

Instructions:

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4. Exchange/Sharing of stationery, calculator etc. not allowed.
5. Write your PRN Number on Question Paper.

			Marks	CO	PO
Q1	a	Find the current through 6 Ω resistor using Norton's theorem.	6	1	1, 2
	b	Find the current through all resistances using Nodal analysis.	6	1	1, 2
Q2	a	A 200 V, 120 W lamp is to be operated on a 240 V, 50 Hz supply. Calculate the value of the capacitor that would be placed in series with the lamp in order that it may be used at its rated voltage.	6	1	1, 2
	b	A balanced star connected load has an impedance of $(2 + j3.46)$ Ω between line and neutral. If the voltage across phase R and N is $20\angle30°$ volts, find the current in phases Y and B. What is the voltage from line B to neutral? Also obtain V_{RB}.	6	1	1, 2

Q 3	a	Find the current through each element of the circuit shown in the figure. Also draw the phasor diagram. 	6	1	1,
	b	A core forms a closed magnetic loop of path length 32 cm. Half of this path has a cross-sectional area of 2 cm² and relative permeability 800. The other half has a cross-sectional area of 4 cm² and relative permeability 400. Find the current needed to produce a flux of 0·4 Wb in the core if it is wound with 1000 turns of insulated wire. Ignore leakage and fringing effects.	6	2	
Q 4	a	The ohmic resistance of the primary and secondary windings of a 27.5 kVA, 450/112 V single-phase transformer are 0.055 Ω and 0.00325 Ω respectively. At the rated supply voltage, the iron losses are 170 W. Calculate (i) the full load efficiency at a p.f. of 0.8 lagging (ii) half load efficiency at unity power factor.	6	2	
	b	Draw and explain the speed-current, torque-current and speed-torque characteristics of DC shunt motor. Also state its applications.	6	3	
Q 5	a	With the help of a neat circuit diagram, explain the working of a single-phase half bridge voltage source inverter.	4	3	
	b	In a household electric circuit, where is the MCB connected? What is its function? State any two advantages of MCB over Fuse.	4	4	
	c	Draw a neat diagram of the fluorescent lamp circuit and state the function of each component in brief.	4	4	