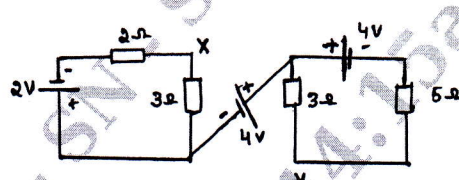USN | | | | | | | | | |

BEEE103/203

First/Second Semester B.E./B.Tech. Degree Examination, Nov./Dec.2023
Elements of Electrical Engineering

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. VTU Formula Hand Book is permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Derive the expression for energy stored in inductor.	6	L3	CO1
	b.	State Fleming's right hand rule and Fleming's left hand rule.	6	L1	CO1
	c.	A circuit consists of 2 parallel resistors having resistance 20Ω and 30Ω respectively, connected in series with a 15Ω resistor. If the current through 30Ω resistor is 1.2A. Find the: i) Currents in 20Ω and 15Ω resistors. ii) The voltage across 15Ω resistors and 20Ω resistor. iii) The voltage across the whole circuit. iv) The total power consumed in the circuit.	8	L3	CO1
		OR			
Q.2	a.	State and explain Faraday's laws of electro magnetic induction.	6	L2	CO1
	b.	What is the potential difference between the point X and Y in the network shown? Fig.Q.2(b)	8	L3	CO1
	c.	State and explain Kirchhoff's laws.	6	L2	CO1
		Module – 2			
Q.3	a.	Obtain the expression for current through pure inductor if the voltage across it is $v = V_m \sin(wt)$.	7	L3	CO1
	b.	A series circuit with resistance of 10Ω, inductance 0.2H and capacitance 40μF is supplied with a 100V supply at 50Hz. Find current, power and power factor.	6	L3	CO2
	c.	Define average value and also derive the respective expression.	7	L2	CO2
		OR			
Q.4	a.	Show that the average power consumed in pure capacitance is 0. Draw the neat wave form for the voltage power and current.	7	L2	CO2
	b.	Voltage of 200V is applied to series circuit consisting of resistor, inductor and capacitor. The respective voltages across these components are 170V, 150V and 100V and the current is 4A. Find power factor, resistance and impedance, inductive and capacitive reactance.	6	L3	CO2
	c.	Two impedances $Z_1 = (6 - j8)\Omega$ and $Z_2 = (16 + j12)\Omega$ are connected in parallel. If the total current of the combination is $20 + j10A$. Find voltage across the combination and currents in the two branches.	7	L3	CO2

		Module – 3			
Q.5	a.	Establish the relationship between phase and line value of voltage and current in 3 phase, delta connected circuit. Show the phasor diagram neatly.	7	L3	CO2
	b.	Three similar coils having resistance of 10Ω and reactance of 8Ω are connected in star across 400V, 3 phase supply determine i) current ii) total power iii) readings of each two wattmeter connected to measure power.	7	L3	CO2
	c.	A balanced star connected load of 8 + j6Ω per phase is connected to 3 phase 230V supply. Find the line current, power factor, power reactive volt ampere and volt ampere.	6	L3	CO2
		OR			
Q.6	a.	What are the advantages of three phase system over single phase system?	6	L2	CO2
	b.	Prove that two wattmeters are sufficient to measure 3ϕ power.	7	L3	CO2
	c.	A three phase load of three equal impedance connected in delta across a balanced 400V supply takes a line current of 10A at a power factor of 0.7 lagging calculate i) The phase current ii) The total current iii) The total reactive volt ampere.	7	L3	CO2
		Module – 4			
Q.7	a.	Write the circuit diagram and switching table for 2 way and 3 way control of lamp.	6	L2	CO5
	b.	Explain the construction of Kelvin's double bridge.	7	L2	CO4
	c.	Explain the construction and working of megger.	7	L2	CO4
		OR			
Q.8	a.	Explain the construction of Maxwell's bridge and derive the expression for unknown inductance.	7	L2	CO4
	b.	Explain the types of wiring.	7	L2	CO4
	c.	Mention the difference between current transformer and potential transformer.	6	L2	CO4
		Module – 5			
Q.9	a.	Explain the necessity and the operation of earth leakage circuit breaker.	7	L2	CO5
	b.	What is earthing? With a neat diagram explain pipe earthing.	7	L2	CO5
	c.	Write a short note on necessity of earthing and precautions to be taken to prevent electric shock.	6	L2	CO5
		OR			
Q.10	a.	What are the desirable characteristics of tariff and explain two port tariff?	7	L2	CO5
	b.	Write a short note on fuse and MCB.	7	L2	CO5
	c.	With a neat circuit diagram explain the operation of RCCB.	6	L2	CO5

* * * * *