



## First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025 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 Data Hand Book is permitted.  
3. M : Marks , L: Bloom's level , C: Course outcomes.

Module – 1			M	L	C
Q.1	a.	State and explain Kirchhoff's laws as applied to DC circuits.	06	L1	CO1
	b.	Derive an expression for energy stored in magnetic field.	06	L2	CO1
	c.	A circuit consists of two parallel resistors having resistance of 20 $\Omega$ and 30 $\Omega$ respectively, connected in series with a 15 $\Omega$ resistor. If the current through 30 $\Omega$ resistor is 1.2 A. Find i) Currents in 20 $\Omega$ and 15 $\Omega$ resistors ii) The voltage across the whole circuit iii) Voltage across 15 $\Omega$ resistor and 20 $\Omega$ resistor iv) Total power consumed in the circuit.	08	L3	CO3
<b>OR</b>					
Q.2	a.	State and explain Ohm's law and list out its limitations.	06	L1	CO1
	b.	Define coefficient of coupling. Prove that the coefficient of mutual inductance M between two coils of self-inductances $L_1$ and $L_2$ is given by $M = K\sqrt{L_1 L_2}$ .	08	L2	CO1
	c.	A coil consists of 600 turns and a current of 10 A in the coil gives rise to a magnetic flux of 1 Mwb. Calculate i) Self inductance ii) Energy stored iii) emf induced when the current is reversed in 0.01 s.	06	L3	CO3
Module – 2					
Q.3	a.	Define the (i) Frequency (ii) Form factor (iii) Peak factor of sinusoidally varying voltage.	06	L1	CO2
	b.	Derive the expression for RMS value of a sinusoidally varying quantity.	06	L2	CO2
	c.	A current of 0.9 A flows through a series combination of a resistor of 120 $\Omega$ and a capacitor of reactance 250 $\Omega$ . Find the impedance, power supply voltage, voltage across resistor, voltage across capacitor, apparent power, active power and reactive power.	08	L3	CO3
<b>OR</b>					
Q.4	a.	Explain the generation of single phase AC induced EMF with suitable diagram.	08	L2	CO2



Q.4	b.	Obtain the behaviour of a voltage, current, power in a pure inductor, connected to a single phase ac supply.	06	L2	CO2
	c.	An ac sinusoidal voltage $V = (160 + j120)V$ is applied to a circuit. The resulting current is $I = (-4 + j10)A$ . Find the impedance of the circuit and state whether it is inductive or capacitance. Also, find the power factor, active power and reactive power.	06	L3	CO3
<b>Module – 3</b>					
Q.5	a.	Compare 3- $\phi$ star and delta connection systems.	06	L2	CO2
	b.	In 3- $\phi$ delta connections, find the relation between line and phase values of current and voltages. Also derive equation for three phase power.	08	L3	CO2
	c.	Two-wattmeter method was used to determine the input power to a three-phase motor. The readings were 5.2 KW and – 1.7 KW, and the line voltage was 415 V. Calculate (i) the total power (ii) power factor (iii) the line current.	06	L3	CO3
<b>OR</b>					
Q.6	a.	What are the advantages of three phase system over single phase system.	06	L2	CO2
	b.	S.T the power factor in the balanced 3- $\phi$ connected circuit can be measured by two wattmeter. Draw the circuit and vector diagram.	08	L2	CO2
	c.	A 400 V, 3- $\phi$ supply is connected across a balanced load of three impedances each consisting of 32 $\Omega$ resistance and 24 $\Omega$ inductive reactance. Determine the current drawn from the power mains, if the three impedances are (i) Y – connected (ii) $\Delta$ - connected.	06	L3	CO3
<b>Module – 4</b>					
Q.7	a.	With neat diagram explain two types of wiring.	06	L2	CO5
	b.	Mention the difference between current transformer and potential transformer.	08	L2	CO4
	c.	Explain the construction and working of Wheatstone's bridge.	06	L2	CO1
<b>OR</b>					
Q.8	a.	Explain the construction and working of Megger.	06	L2	CO4
	b.	Explain the construction and working of Kelvin's double bridge.	06	L2	CO4
	c.	Explain two-way and three-way control of the lamp with circuit and truth table.	08	L3	CO5
<b>Module – 5</b>					
Q.9	a.	Write short notes on Fuse and MCB.	06	L2	CO5
	b.	What is electric shock? Give the list of preventive measures against the shock.	06	L2	CO5
	c.	What are the characteristics of tariff and explain two part tariff.	08	L2	CO5
<b>OR</b>					
Q.10	a.	With neat circuit diagram explain operation of RCCB.	06	L2	CO5
	b.	Explain types of earthing with diagrams.	08	L2	CO5
	c.	List out the power ratings of the household appliances including air conditioner, laptop, printer etc. Find the power consumed.	06	L2	CO5

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