CBCS SCHEME

First Semester B.E./B.Tech. Degree Examination, June/July 2025
Introduction to 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.	List the differences between conventional and non-conventional energy sources.	04	L1	CO1
	b.	What is the purpose of single line diagrams? Explain a typical power system with the help of a labelled single line diagram.	10	L2	CO5
	c.	Two resistors are connected in parallel and a voltage of 200 V is applied to the terminals. The total current is 25 A and the power dissipated in one of the registors is 1500 W. What is the resistance of each?	06	L3	CO2
		OR			
Q.2	a.	State and explain Ohm's law. List the limitations of Ohm's law.	06	L3	CO2
	b.	With the help of a block diagram explain nuclear power generation.	06	L2	CO1
	c.	A circuit consists of two parallel resistors having resistances 20 Ω and 30 Ω, connected in series with 15 Ω. If the current through 15 Ω resistor is 3 A, find i) Current in 20 Ω and 30 Ω ii) Voltage across the whole circuit iii) Total power and power consumed in all resistances.	08	L3	CO2
		Module – 2			
Q.3	a.	Define the following terms with reference to a sinusoidally a.c. quantity: i) RMS value ii) Average value iii) Form factor iv) Frequency v) Peak factor vi) Phase difference	06	L3	CO2
	b.	An alternating current varying sinusoidally with a frequency of 50 Hz has RMS value of 20 A. Write down the equation for the instantaneous value and find this value 0.0025 seconds after passing through a positive maximum value.	06	L2	CO2
	c.	Show that the current through a pure inductor lags the applied voltage by 90° and the average power consumed is zero. Draw the waveforms of voltage, current and power.	08	L3	CO2
		OR			
Q.4	a.	Define the following terms with reference to a.c. quantity: i) Active power ii) Reactive power iii) Apparent power	06	L3	CO2
	b.	List the advantages of 3 phase system over single phase system.	05	L2	CO2
	c.	Three identical coils, each of resistance 20 Ω and inductance 0.5 H are connected in (i) Star (ii) Delta, to a 3 phase, 400 V, 50 Hz supply. Determine in each case (a) the line current (b) total power consumed.	09	L2	CO2

Module – 3

Q.5	a.	With a neat sketch, explain the principle and working of a DC motor.	08	L2	CO3
	b.	Starting from basic principles, derive the EMF equation of a DC generator.	06	L3	CO3
	c.	A 4-pole DC generator has 564 conductors on its armature and is driven at 800 rpm, the flux per pole is 20 mWb. The current in each conductor is 60 A. Calculate the total current emf and power generated in the armature is (i) wave-wound (ii) lap-wound.	06	L3	CO3

OR

Q.6	a.	Define back-emf and explain its significance.	06	L2	CO3
	b.	Starting from fundamentals, derive the torque equation of a DC motor.	08	L3	CO3
	c.	A 4-pole, lap wound DC motor has 40 slots each having 20 conductors on its armature. It runs at 360 rpm and takes an armature current of 40 A, with a flux/pole of 45 mWb. Calculate the torque and mechanical power developed.	06	L3	CO3

Module – 4

Q.7	a.	Starting from fundamentals, derive the emf equation of a transformer.	06	L3	CO3
	b.	With a neat sketch, explain the squirrel cage and wound rotors of a 3 phase induction motor.	06	L2	CO3
	c.	A 50 KVA transformer has an efficiency of 98% at full load, 0.8 p.f and has an efficiency of 96.9% at ¼ full load, 0.8 p.f. Determine the iron loss and full load copper loss.	08	L3	CO4

OR

Q.8	a.	With the help of neat vector diagrams, explain the production of a rotating magnetic field in a 3 phase induction motor.	08	L2	CO3
	b.	Derive the condition for maximum efficiency of a transformer.	06	L2	CO4
	c.	An 8-pole alternator runs at 750 rpm and supplied power to a 6-pole induction motor which has a full load slip of 3%. Find the full load speed of the motor and the frequency of the rotor emf.	06	L3	CO4

Module – 5

Q.9	a.	Explain two-way and three way control of lamps with the help of circuit diagram and switching table.	08	L2	CO5
	b.	What is earthing? With the help of a neat diagram, explain pipe earthing.	06	L2	CO5
	c.	Explain the working principle of fuse. List the requirements of a good fuse.	06	L2	CO5

OR

Q.10	a.	What is electric shock? List the measures to be taken to prevent electric shock.	06	L2	CO5
	b.	What is tariff? Explain 2 part tariff with its advantages and disadvantages.	08	L2	CO5
	c.	Explain the different types of domestic wiring.	06	L2	CO5

* * * * *