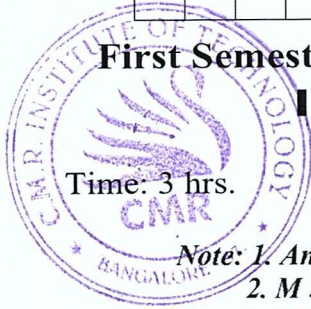


CBCS SCHEME

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1BESC104B



First Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 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. M : Marks , L: Bloom's level , C: Course outcomes.
3. VTU Formula Hand Book is permitted.*

Module – 1				M	L	C
Q.1	a.	List differences between conventional and non-conventional energy sources.	7	L1	CO1	
	b.	State Ohm's law and mention its limitations.	6	L2	CO1	
	c.	A resistance R is connected in series with a parallel circuit comprising of 20Ω and 48Ω. The total power dissipated in the circuit is 1000W and applied voltage is 250V. Calculate R.	7	L3	CO1	
OR						
Q.2	a.	Draw and explain simple single-line diagram of a power supply system including generation → transmission → distribution.	7	L1	CO1	
	b.	State and Explain Kirchhoff's Laws.	6	L2	CO1	
	c.	In the network shown in Fig. 2(c) determine the direction and magnitude of current flow in the milli-ammeter A, having internal resistance of 10 Ω.	7	L3	CO1	
<div style="text-align: center;"> <p>Fig. 2(c)</p> </div>						
Module – 2						
Q.3	a.	Define: i) Amplitude ii) RMS Value iii) Average Value iv) Form Factor v) Peak Factor with respect to sinusoidally varying quantity.	5	L1	CO2	
	b.	Distinguish clearly between : i) balanced and unbalanced supply ii) balanced and unbalanced load.	8	L2	CO2	
	c.	A circuit consisting of a resistance of 25 Ω and a capacitance of 100μF connected in series. A supply of 200V at 50Hz is applied across the circuit. Find Current, power factor and power consumed by the circuit.	7	L3	CO2	
OR						

Q.4	a.	In a three-phase star connection, find the relation between line and phase values of current and voltages.	7	L2	CO2
	b.	Derive an equation for power consumed in R-L-C series circuit.	7	L2	CO2
	c.	A delta connected load consists of a resistance of 10Ω and a capacitance of $100\mu\text{F}$ in each phase. A supply of 410V at 50Hz is applied to the load. Find the line current, power factor and power consumed by the load.	6	L3	CO2
Module – 3					
Q.5	a.	Derive the torque equation of a D.C. motor.	7	L3	CO3
	b.	With a neat sketch explain the construction of the various parts of a DC Machine.	8	L2	CO3
	c.	Determine the total torque developed in a 250V, 4 pole DC shunt motor with lap winding accommodated in 60 slots, each containing 20 conductors. The armature current is 50A and the flux per pole is 23mWb.	5	L3	CO3
OR					
Q.6	a.	Derive an EMF equation for DC generator with usual notations.	6	L3	CO3
	b.	Explain the following characteristics of a D.C. Series motor: (i) Torque vs armature current (ii) Speed vs armature current	8	L2	CO3
	c.	The armature of an 8 pole DC generator has 960 conductors and runs at 400rpm. The flux per pole is 40mWb. Calculate the induced emf when the armature is lap wound. At what speed should it be rotated to generate 400V, if the armature is wave connected.	6	L3	CO3
Module – 4					
Q.7	a.	Derive the emf equation of a transformer and hence obtain the voltage and current transformation ratios.	7	L3	CO4
	b.	Explain the construction and working of 3-phase induction motor.	6	L2	CO4
	c.	A 50kVA, 3300/330 V, single phase transformer has iron loss and full load copper loss of 400W and 600W respectively. Calculate the efficiency at half full load and 0.9 pf.	7	L3	CO4
OR					
Q.8	a.	Define slip of an induction motor. Derive an expression for effect of slip on the rotor frequency.	7	L3	CO4
	b.	Explain the working principle of single – phase transformer and its necessity in power system.	7	L2	CO4
	c.	A 3 phase, 4pole, 440V, 50Hz induction motor runs with a slip of 4%. Find the rotor speed and frequency of the rotor current.	6	L3	CO4

Module – 5

Q.9	a.	What is Earthing? With a neat diagram, explain pipe earthing.	7	L2	C05
	b.	Define Electric shock. What are the safety precaution to be taken against to avoid electric shock?	7	L2	C05
	c.	Explain what a "unit" (kWh) means in an electricity bill. Give an example of how it's calculated for a 60W bulb used for 5 hours.	6	L3	C05
OR					
Q.10	a.	With neat wiring diagram and truth table explain two way and three way control of lamp.	6	L2	C05
	b.	What is Fuse? With neat diagram, explain the working principle of fuse.	7	L2	C05
	c.	Mention the power rating of the following electrical appliances. i) TV ii) Laptops iii) LED Lights iv) Refrigerator Calculate the total power consumed by these four appliances.	7	L3	C05

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