CBCS SCHEME

USN | | | | | | | | | | |

BESCK204B

Second 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.	Enumerate and explain briefly the essential elements of hydro power plant.	06	L2	CO1
	b.	State and explain Kirchhoff's laws.	06	L2	CO2
	c.	A resistance of 5 Ω is connected in series with a parallel combination of 4 Ω and 12 Ω. If the current through 5 Ω resistor is 10 A, find the (i) Currents in 4 Ω and 12 Ω resistors, (ii) Supply voltage and (iii) Power dissipated by each resistor.	08	L3	CO2
		OR			
Q.2	a.	List the advantages and disadvantages of nuclear power plant.	06	L1	CO1
	b.	List the characteristics of parallel circuit. Obtain the expression for current through any resistor in a parallel circuit.	06	L1	CO2
	c.	Two batteries having emfs of 10 V and 7 V, and internal resistances of 2 Ω and 3 Ω respectively, are connected in parallel across a load of resistance 1 Ω. Calculate (i) the current supplied by each battery, (ii) the current through the load, and (iii) the voltage across the load.	08	L3	CO2
		Module – 2			
Q.3	a.	Show that the pure inductance does not dissipate any power. Draw the phasor diagram and the waveforms of voltage and current.	06	L2	CO2
	b.	What are the advantages of three phase system over a single phase system?	06	L1	CO2
	c.	A coil has a resistance of 10 Ω and draws a current of 5 A when connected across a 100 V, 60 Hz source. Determine (i) the inductance of the coil (ii) the power factor of the circuit (iii) the voltage across inductance and (iv) the reactive power.	08	L3	CO2
		OR			
Q.4	a.	Derive an expression for the average power consumed by a R-L series circuit. Draw the phasor diagram and the waveforms of voltage and current.	06	L2	CO2
	b.	A three-phase, delta connected load consumes a power of 120 KW, drawing a lagging line current of 200 A from a three-phase, 400 V, 50 Hz supply. (i) Find the parameters of each phase, (ii) What would be the power consumed if the loads were connected in star?	06	L3	CO2
	c.	A coil of resistance 10 Ω and inductance 0.1 H is connected in series with a 150 μF capacitor across a 200 V, 50 Hz supply. Calculate (i) the impedance, ii) the current, iii) the power factor, iv) the voltage across the coil and the capacitor.	08	L3	CO2

		Module – 3			
Q.5	**a.**	Explain the function of main parts of a dc machine.	**06**	**L2**	**CO3**
	b.	Sketch and explain speed-load characteristics of (i) series motor (ii) shunt motor. Mention two applications of each motor.	**06**	**L2**	**CO3**
	c.	A 4-pole, shunt generator with Lap-connected armature has field and armature resistances of 50 Ω and 0.1 Ω respectively. It supplies power to sixty 100 V, 40 W lamps. Calculate (i) the armature current (ii) the current per armature path, and (iii) the generated emf. Allow a contact drop of 1 V per brush.	**08**	**L3**	**CO3**
		OR			
Q.6	**a.**	Derive the emf equation for a dc generator.	**06**	**L2**	**CO3**
	b.	Explain the different methods used to control the speed of dc series motor.	**08**	**L2**	**CO3**
	c.	A 6 pole, Lap-connected dc series motor, with 864 conductors, takes a current of 110 A at 480 V. The armature and series-field resistance are 0.18 Ω and 0.02 Ω respectively. The flux per pole is 50 mwb. Calculate (i) the speed, and (ii) the gross torque developed by the armature.	**06**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Derive the emf equations of a transformer and hence find the transformation ratio.	**06**	**L2**	**CO4**
	b.	Explain the principle of operation of a 3-phase induction motor and give reason for an induction motor cannot run at synchronous speed.	**06**	**L2**	**CO4**
	c.	A 600 KVA, single phase transformer has an efficiency of 92% both at full load and half full load, upf. Determine its efficiency at 75% full load, 0.9 pf.	**08**	**L3**	**CO4**
		OR			
Q.8	**a.**	Define slip. Derive an expression for frequency of rotor current. In what way, an induction motor is similar to a transformer?	**06**	**L2**	**CO4**
	b.	Explain the various losses that occur in a transformer. Also derive the condition for maximum efficiency of a transformer.	**08**	**L2**	**CO4**
	c.	A 4-pole, 3-phase, 50 Hz induction motor runs at a speed of 1470 rpm. Find (i) the synchronous speed (ii) the slip and (iii) the frequency of the induced emf in the rotor.	**06**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	With relevant circuit diagrams and switching tables, explain two-way and three-way control of a lamp. Mention its applications.	**08**	**L2**	**CO5**
	b.	Write a short note on Fuse and MCB.	**06**	**L2**	**CO5**
	c.	Explain the necessity of earthing. Explain pipe earthing with a neat diagram.	**06**	**L2**	**CO5**
		OR			
Q.10	**a.**	Explain different types of wiring systems.	**06**	**L2**	**CO5**
	b.	What is electric shock? What are the precautions to be taken to prevent electric shock?	**06**	**L1**	**CO5**
	c.	Define "unit" used for consumption of electrical energy and explain two-part tariff. Mention its advantages and disadvantages.	**08**	**L2**	**CO5**