Siddaganga Institute of Technology, Tumakuru-572 103

(An Autonomous Institution affiliated to VTU, Belagavi, Approved by AICTE, New Delhi)

Second Semester Bachelor of Engineering Examinations July-Aug. 2024

Introduction to Electrical Engineering

[Except EE]

Time: 3 Hours **Max. Marks: 100**

Note : 1. Revealing of Identity in any form in the answer book will be treated as malpractice.
2. Answer any five questions choosing one full question from each unit.

Unit - I

			M	BL	CO	PO	PSO
1	a)	Explain the working of hydro power station with the help of neat block diagram.	6	2	1	1	
	b)	State and explain Kirchoff's voltage and current laws.	6	2	1	1	
	c)	Two batteries A and B are connected in parallel and a load of 10Ω is connected across its terminals. Battery A has an emf of 12V and internal resistance 2Ω. Battery B has an emf 8V and internal resistance 1Ω. Apply kirchoff laws to determine the currents in all branches and the voltage across the load.	8	3	1	1	1

OR

|			M	BL	CO	PO	PSO
2	a)	Explain solar and wind power generation with the help of neat block diagram.	8	2	1	1	
	b)	A resistance R is connected in series with a parallel circuit comprising 20Ω and 48Ω. The total power dissipated in the circuit is 1000w and the applied voltage is 250V. Calculate R.	6	2	1	1	
	c)	In the given circuit shown in Fig. 2C. Find the currents flowing in the various branches of the circuit.					

Fig. 2C

			M	BL	CO	PO	PSO
			6	2	1	1	
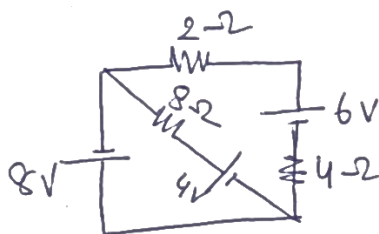
Unit - II

			M	BL	CO	PO	PSO
3	a)	Show that the power consumed by an R-C series circuit in EI cosθ.	6	2	2	1	
	b)	An Inductive coil drawn a current of 2A. When connected to a 230V, 50Hz supply. The power taken by this coil is 100w. Compute the resistance and inductance of the coil.	7	2	2	1	
	c)	A balanced 3-Q star connected load of 150kw takes a leading current of 100A with a line voltage of 1100V at 50Hz. Find the circuit constants of the load per phase.	7	2	2	1	

OR

			M	BL	CO	PO	PSO
4	a)	Prove that in a purely Inductive circuit, the current lags voltage by 90. Sketch this waveform of voltage and current.	6	2	2	1	
	b)	A series RLC circuit is composed of 100Ω resistance, 1.0H inductance and 5μF capacitance connected across 100V at 50Hz AC supply. Solve for the current and voltage V_R, V_L and V_C.	7	2	2	1	
	c)	A delta connected load consists of a resistance of 10Ω and a capacitance of 100μF in each phase. A- 3phase supply of 410 volts at 50Hz is applied to the load. Find the line current power factor and power consumed by the load.	7	2	2	1	

Unit - III

5 a) Classify D C generators. Write the circuit diagram for i) DC series generator. ii) DC shunt generator. Write the voltage and current equation in both cases.   8   2   3   1

   b) Draw this torque v/s load current characteristics of DC series and shunt motor. Mention its applications.   6   2   3   1

   c) The Current drawn from the mains by a 220V DC shunt motor is 4A on no-load. The field winding resistance is 110Ω and armature winding resistance is 0.2Ω. If the line current on full load is 40A at a speed of 1500rpm, Calculate the no-load speed.   6   3   3   1

OR

6 a) Derive an expression for the emf generated in the armature of a DC generator.   6   2   3   1

   b) Derive an expression for the torque developed in the armature of a DC motor.   6   2   3   1

   c) A 4 pole DC shunt generator with lap connected armature has field and armature resistance of 50Ω and 0.1Ω respectively. If the generator supplies sixty 100V, 40W lamps, calculate the total armature current, the current in each armature conductor and the generated EMF. Take 1V per brush as contact drop.   8   3   3   1

Unit - IV

7 a) Derive an expression for emf equation of a transformer. Mention types of transformers.   6   2   4   1

   b) A 125KVA transformer has a primary voltage of 2000V at 60Hz. The primary turns are 182 and secondary form are 40. Neglect losses and calculate i) No-load secondary emf   ii) Full load primary and secondary currents iii) Flux in the core.   6   3   4   1

   c) Show that a rotating magnetic field of constant magnitude is developed in the stator winding of a three phase induction motor with the help of vector diagram.   8   2   4   1

OR

8 a) Explain principle of operation of a transformer on load with the help of neat figures to show that the flux remains constant with load variation.   8   2   4   1

   b) A 1KVA transformer working at unity power factor has an efficiency of 90% at both half full load and full load. Calculate the efficiency at 3 full load of the transformer.   6   2   4   1

   c) A 3 phase induction motor is wound for 4-pole and is supplied from a 50Hz supply. Determine i) Synchronous speed ii) The speed of the rotor when the slip is 4% iii) The rotor frequency when the speed of the rotor is 600rpm.   6   3   4   1

Unit - V

9 a) Explain three way control of lamp with truth table and neat circuit diagram.   6   2   5   1

   b) Explain two-part tariff with example.   4   1   5   1

   c) Explain plate-earthing with the help of neat sketch.   6   2   5   1

   d) List the safety precaution to avoid electric shock.   4   1   5   1

OR

10 a) Discuss different types of wiring used for domestic purposes.   6   2   5   1

   b) Discuss the merits and demerits of Fuse and MCB.   6   2   5   1

   c) Explain pipe earthing with the help of neat sketch.   8   2   5   1

_____