



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

First Semester, B.E. - Semester End Examination; May - 2022

Basic Electrical Engineering

(Common to All Branches)

Time: 3 hrs

Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Analyze single phase and three phase AC circuits.

CO2: Demonstrate their understanding about earthing and different types of earthing.

CO3: Demonstrate their understanding about different types of measuring instruments and their usage.

CO4: Identify and analyze the parts of DC machines, Transformers, Alternators and Induction machines.

CO5: To get an overview of special electrical machines.

Note: I) PART - A is compulsory. Two marks for each question.

II) PART - B: Answer any Two sub questions (from a, b, c) for a Maximum of 18 marks from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
I : PART - A		10			
I a.	What is the difference between apparent power and real power in an AC circuit?	2	L1	CO1	PO1
b.	Justify the necessity of three phase system over single phase system.	2	L6	CO2	PO1
c.	Name the material of the brushes in DC machines. Why do you use this material?	2	L1	CO3	PO1
d.	How do the iron losses vary with the load on the transformer?	2	L2	CO4	PO1
e.	Write any two applications of Brush less DC motor.	2	L1	CO5	PO1
II : PART - B		90			
UNIT - I		18			
1 a.	Show that the power consumed in a pure capacitor circuit is zero. Draw the relevant circuit diagram, Phasor diagram, waveforms.	9	L5	CO1	PO2
b.	An inductive coil is connected in series with a resistance of 50 ohms across a 230 V, 50 Hz AC supply. The voltage across the coil is 180 V and across the resistance is 130 V. Calculate;	9	L3	CO1	PO1
	i) Resistance and inductance of coil				
	ii) Power dissipated in coil				
	iii) Also draw the vector diagram				
c.	An alternating voltage of $(160 + j120)$ V is applied to a circuit and the current in the circuit is given by $(6 + j8)$ A. Find;	9	L3	CO1	PO3
	i) The values of the elements of the circuit				
	ii) The power factor of the circuit				
	iii) The power consumed				
	iv) Draw the vector diagram				

UNIT - II		18			
2 a.	A balanced Star-connected load of $(8 + j6)$ ohms per phase is connected to a 3-phase, 230 V supply. Find the line current, power factor, power, reactive volt ampere and total volt-amperes.	9	L3	CO2	PO3
b.	What is meant by earthing of electrical appliances? Explain pipe earthing.	9	L1	CO2	PO1
c.	Explain the construction and working of a single phase induction type energy meter.	9	L2	CO2	PO1
UNIT - III		18			
3 a.	Explain the working principle of a DC generator and a DC motor. Mention the different types of DC motors and their applications.	9	L3	CO3	PO2
b.	A 6 pole lap wound, 220 V shunt excited DC machine takes an armature current of 2.5 Ampere on no load and runs at 950 rpm. On load, it takes an armature current of 54 ampere and also runs 950 rpm. The armature resistance is 0.18Ω and it has 1044 armature conductors. Calculate on load:	9	L6	CO3	PO2
	i) Induced emf				
	ii) Useful flux				
	iii) Total torque developed by the machine				
c.	Explain the constructional features of synchronous generator with relevant diagrams.	9	L4	CO3	PO1
UNIT - IV		18			
4 a.	Draw the construction of core and shell type transformers and give a detailed comparison between them.	9	L5	CO4	PO1
b.	A 600 kVA single phase transformer has an efficiency of 92% both at full load and half-load at unity power factor. Determine its efficiency at 75% of full load at 0.9 power factor lag.	9	L6	CO4	PO2
c.	With vector diagrams prove that a rotating magnetic field of constant magnitude is produced in the stator of an induction motor when connected to a balanced three-phase supply.	9	L5	CO4	PO3
UNIT - V		18			
5 a.	With circuit arrangement, explain the capacitor start and capacitor run single phase induction motor.	9	L1	CO5	PO2
b.	Give a comparison between servo motor and stepper motor. Also mention their applications.	9	L2	CO5	PO2
c.	Describe the operating principle and construction of a brushless DC motors.	9	L4	CO5	PO1