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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
First / Second Semester, B.E. - Semester End Examination; Sep. / Oct. - 2023
Basic Electrical Engineering
(Common to All Branches)

Time: 3 hrs   *Max. Marks: 100*

Course Outcomes
The Students will be able to:
CO1: Analysis of single phase AC circuits.
CO2: Illustrate the working DC Machine as a Generator and Motor.
CO3: Analyze the three phase AC circuits and explain the working of three phase induction motor.
CO4: Discuss the working of transformer and alternator.
CO5: Describe the concept of green energy and basics of power systems.

<u>*Note:*</u> I) **PART - A** *is compulsory.* **Two** *marks for each question.*
    II) **PART - B**: *Answer any* <u>**Two**</u> *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**			
1 a.	Define real and Reactive power.	2	L1	CO1	PO1
b.	State the working principle of DC generator.	2	L1	CO2	PO1
c.	Mention any two advantages of three phase system over single phase system.	2	L1	CO3	PO1
d.	Why iron loss remains constant? Justify.	2	L1	CO4	PO1
e.	Mention the causes of Electric shock.	2	L1	CO5	PO2
	II : PART - B	**90**			
	UNIT - I	**18**			
2 a.	Derive an expression for instantaneous power in RC series circuit and draw the related waveform with equations.	9	L2	CO1	PO2
b.	i) Define RMS values of alternating quantity. ii) Explain phase lag and phase lead of an alternating quantity with related waveform and equations.	9	L2	CO1	PO2
c.	The voltage and current in an AC circuit are; $v = 200\sin(377t + 30°)$ and $I = 10\sin(377t + 60°)$. Determine the average power.	9	L3	CO1	PO1,2
	UNIT - II	**18**			
3 a.	With a neat sketch, explain the construction of a DC machine and function of each part.	9	L2	CO2	PO2
b.	i) What is back EMF? Explain its significance. ii) Derive an expression for torque developed by a DC motor.	9	L1	CO2	PO2

c. A 4 pole DC shunt motor takes 22.5 A from a 250 V supply. The armature resistance is 0.5 Ω. The armature is wave wound with 30 slots and 10 conductors per slot. If the flux per pole is 0.02 wb. Calculate;   9   L3   CO1 PO1,2

i) Speed   ii) Torque developed   iii) Power developed

UNIT - III   18

4 a. Develop the relation between line and phase values for 3-φ balanced delta connected system and hence derive an expression for power.   9   L2   CO3   PO2

b. Explain the concept of rotating magnetic field in a three phase induction motor.   9   L2   CO3   PO2

c. i) A 6 pole, 50 Hz three phase induction motor which runs at 970 rpm. What is the slip of the induction motor?

ii) With neat sketch and related waveforms, explain the generation of 3φ AC voltages.   9   L3   CO3 PO1,2

UNIT - IV   18

5 a. i) Explain the working principle of a transformer.   4

ii) With usual notation, derive the EMF equation of a synchronous generator.   5   L2   CO4   PO2

b. Find the efficiency of a single phase 150 kVA transformer at;

i) 25% full load

ii) 100% full load at .8 PF lag, if copper loss is 1600 W at full load and Iron loss is 1400 W   9   L2   CO4   PO2

c. With neat sketch, explain the constructional features of synchronous generators.   9   L2   CO4   PO2

UNIT - V   18

6 a. i) What are the necessities of earthing? Explain any one type of earthing with a neat diagram.   9   L2   CO5   PO2

ii) Mention the properties of fuse.

b. Draw and explain the single line diagram of a typical transmission and distribution scheme.   9   L2   CO5   PO2

c. With block diagram, explain the concept of power generator from wind energy systems.   9   L2   CO5   PO2

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