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**P.E.S. College of Engineering, Mandya - 571 401**  
 (An Autonomous Institution affiliated to VTU, Belagavi)  
**Second Semester, B.E. - Semester End Examination; July/Aug. - 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 wiring.

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

CO4: Identify and analyse 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
<b>I : PART - A</b>		<b>10</b>
I a.	Define form factor and obtain the value of it for an AC quantity.	2
b.	What is phase sequence? Explain the same with the help of relevant figure.	2
c.	Bring out the difference between statically induced emf and dynamically induced emf.	2
d.	Define the terms; i) Self-inductance and ii) Mutual inductance, giving the expression for each.	2
e.	Mention any four applications of a permanent magnet stepper motor.	2
<b>II : PART - B</b>		<b>90</b>
<b>UNIT - I</b>		<b>18</b>
1 a.	Starting with the methods of generation of sinusoidal ac voltages, obtain the expression for alternating emf. With the help of figure.	9
b.	With relevant circuit diagram and phasor diagram prove that the average power consumed by a pure capacitor is zero.	9
c.	A choke coil takes a current of 2 A, lagging 60° behind the applied voltage of 200 V at 50 Hz, Calculate the inductance, resistance and impedance of the coil. Also determine the power consumed when it is connected across 100 V, 25 Hz supply.	9
<b>UNIT - II</b>		<b>18</b>
2 a.	A balanced 3- $\phi$ , y connected load of 150 kW takes a leading current of 100 A with a line voltage of 1100 V, 50 Hz. Find the circuit constants of load per phase.	9
b.	With neat circuit diagram, derive the relationship for voltages and currents in star connected system.	9
c.	What is electric shock? State the causes and precautions to be taken to prevent it.	9

**UNIT - III****18**

- 3 a. What is DC generator? Explain with the help of connection diagram and important relations, the various classifications of DC generators. 9
- b. A 4 pole lap wound shunt generator delivers 200 amperes at terminal voltage of 250 volts, It has a armature and field resistance of  $0.05 \Omega$  and  $50 \Omega$ , respectively. Neglecting the brush drop, Determine; 9
- i) Armature current                      ii) The current per armature parallel path  
iii) EMF generated                      iv) Power developed
- c. Bring out the difference between synchronous generator and DC generator. Derive the emf equation of synchronous generator. With suitable notations. 9

**UNIT - IV****18**

- 4 a. What is transformer? Discuss the various types of losses occurring in a transformer and hence, obtain the expression for efficiency of transformer. 9
- b. A 600 kVA, 1- $\phi$  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
- c. State the advantages and disadvantages of 3- $\phi$ , IM (induction motor).what is slip? Obtain the expression for slip and give its significance. 9

**UNIT - V****18**

- 5 a. What is the difference between brushless DC motor and normal DC motor. Explain with help of neat sketch the construction and working of brushless DC motor. 9
- b. What is stepper motor? Explain the construction and working of permanent magnet stepper motor. 9
- c. What is servomotor? With neat diagram, explain the working principle of the same. 9

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