

Magnetic Circuit

Complete Course of Electrical Machine - Part I (Transformer & Induction Machine)

Electrical Machines

**FOR
ELECTRICAL ENGINEERING**

GATE 2026-27

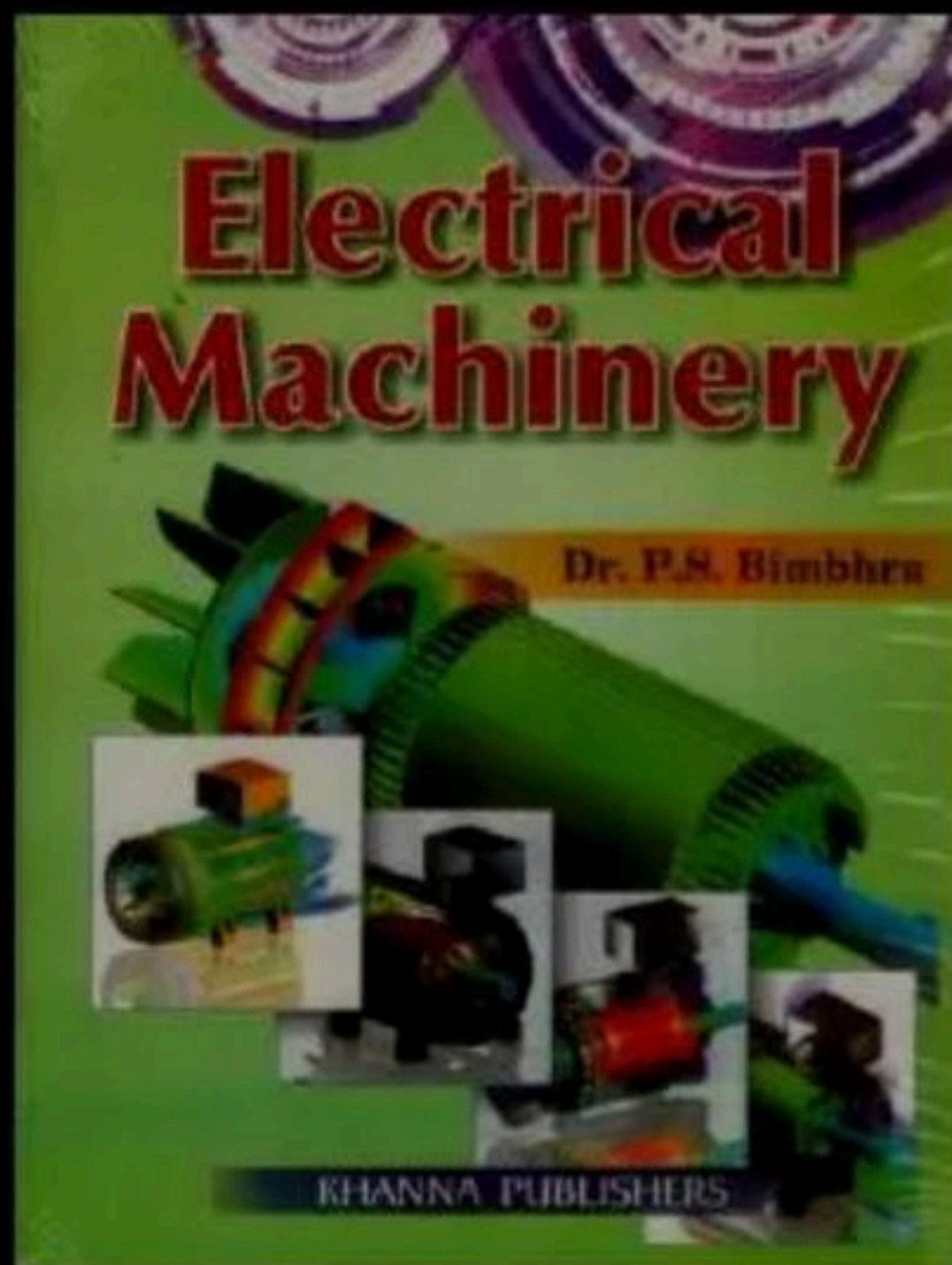
BY MAYANK SIR



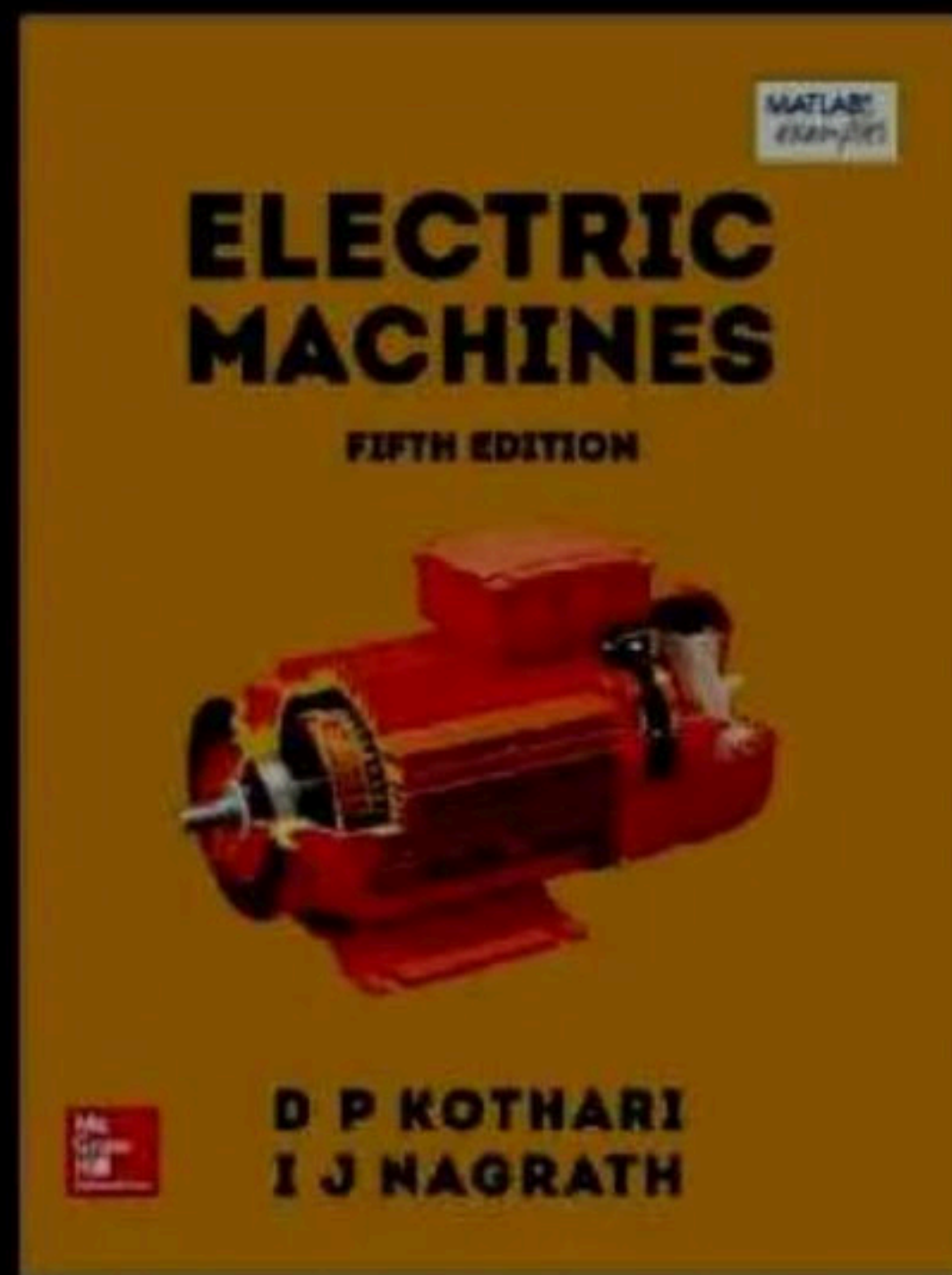
Weightage of Electrical machines in GATE & ESE

Book

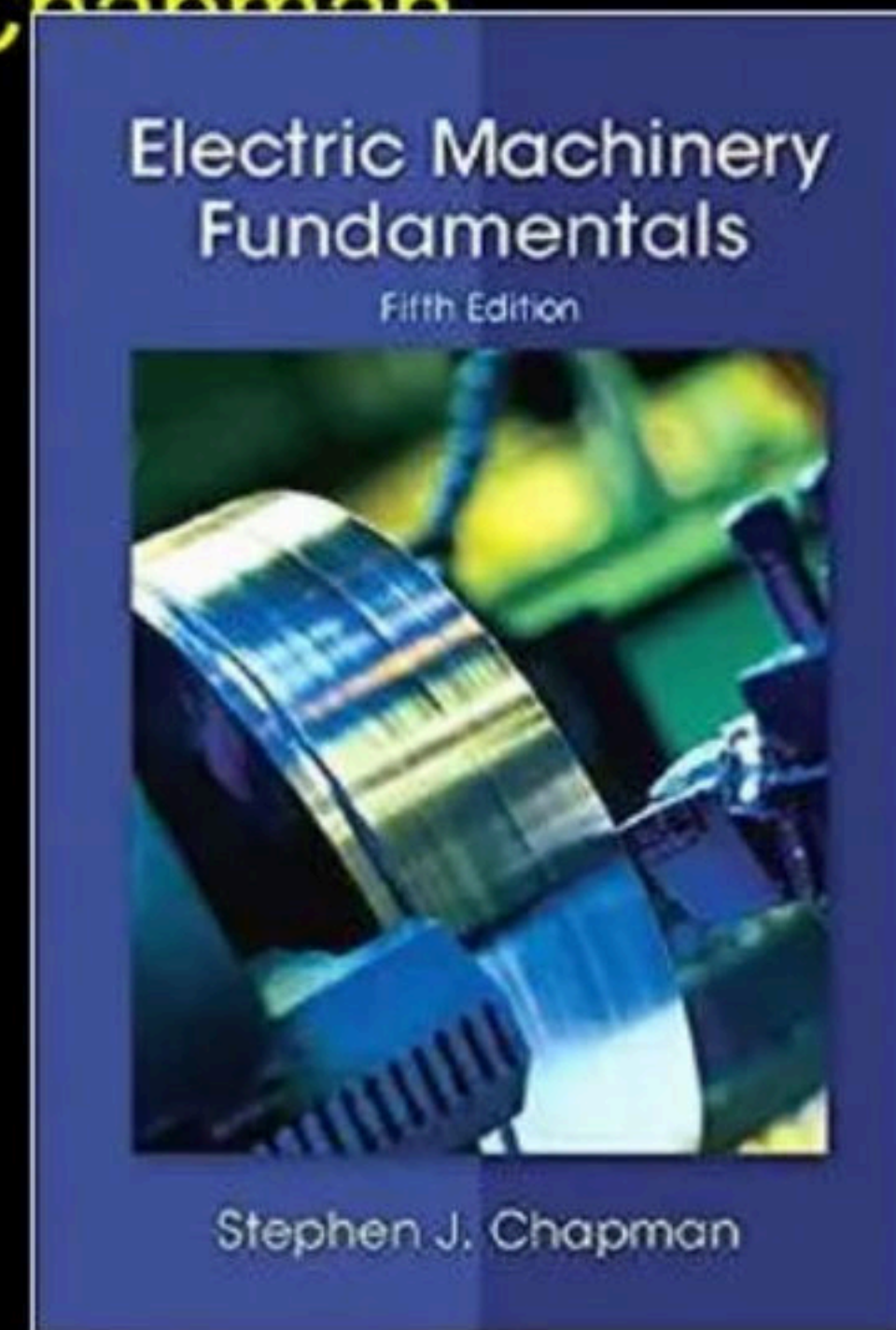
Electrical Machinery by
Dr. P S Bimbhra



Electric Machines by
D P Kothari & I J Nagrath



Electric Machinery
Fundamentals by
Stephen J.
Chapman



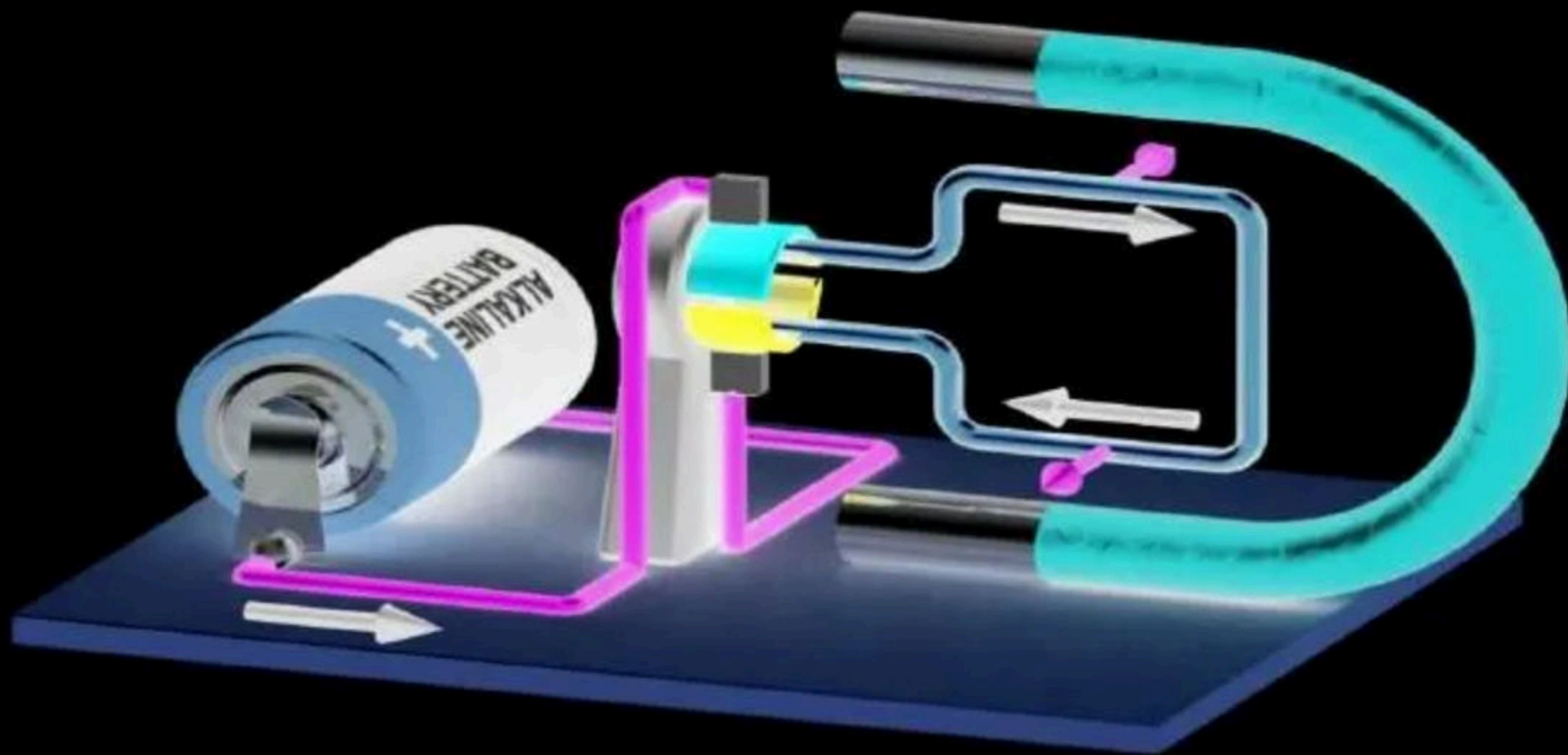
1) Transformer



Topics

- 1) **Construction**
- 2) **Magnetic Circuit and Dot Convention**
- 3) **Induced EMF**
- 4) **Phasor Diagrams**
- 5) **Equivalent Circuits**
- 6) **Testing of Transformers**
- 7) **Losses and Efficiency**
- 8) **Voltage Regulation**
- 9) **Auto-Transformers**
- 10) **Parallel Operation**
- 11) **Three Phase Transformers connections and Phase shift**
- 12) **Harmonics**

2) D.C. Machines



Topics

Construction

Armature Reaction and Commutation

Induced EMF and Torque

DC Generator, Connections and Characteristics

DC Motor, Connections and Characteristics

Losses and Efficiency

Speed Control of DC Motor

Starting of DC Motor

Electrical Braking of DC Motor

3) Induction Machines



Topics

Construction
Rotating Magnetic Field
Equivalent Circuit
Power Flow, Losses and Efficiency
Torque Slip Characteristics
Stability
Testing
Braking
Starting
Speed Control
Single Phase Induction Motor

4) Synchronous Machines



Construction

Rotating Magnetic Field

Induced EMF

Armature Reaction

OCC, SCC and ZPFC

Equivalent Diagram and Phasor Diagram

Voltage Regulation

Power Angle Equations

V Curve and Inverted V Curve

Starting of Synchronous Motor

Losses and Efficiency

Salient Pole Machine

Parallel operation

Strategy for Electrical Machines

- Basic Concepts
- Theoretical Concepts
- Practical Knowledge
- Questions (with increasing level)
- Revision

Rules

1. Punctuality & Regularity

2. Pen and Copy

3. Notes

4. No Distraction

6. GATE Virtual Calculator

7. Patience

8. Revision

Transformer Preparation Strategy



- 1. In depth Analysis**
- 2. Syllabus**
- 3. Weightage of Transformer in GATE**
- 4. Most Important sub topics on the basis of PYQ**

Syllabus of Transformer

- ❖ Construction
- ❖ Magnetic Circuit and Dot Convention
- ❖ Induced EMF
- ❖ Phasor Diagrams
- ❖ Equivalent Circuit
- ❖ Testing of Transformers
- ❖ Losses and Efficiency
- ❖ Voltage Regulation
- ❖ Auto-Transformers
- ❖ Parallel Operation
- ❖ Three Phase Transformers
- ❖ Harmonics



Most asked sub topics in GATE (2000 – 2023)

1	Impedance Transformation and primary current	2003, 2007, 2010, 2014, 2015, 2016, 2020
2.	Losses	2001, 2014, 2016, 2020, 2021
3.	Dot Polarity	2002, 2008, 2009, 2021
4.	Efficiency	2003, 2006, 2007, 2013
5.	Autotransformer	2004, 2009, 2014, 2016
6.	Voltage Regulation	2007, 2018, 2019
7.	Harmonics	2001, 2002, 2009, 2011
8.	Dimensions	2009, 2012, 2014

Most asked sub topics in GATE (2000 – 2022)

9.	Mutual Inductance	2014, 2015
10.	Parallel Operation	2011, 2015
11.	Magnetic Circuit	2018, 2019
12.	Testing	2006, 2008

Most asked sub topics in GATE (2000 – 2022)

1.	Line & Phase (Voltage & Current)	2003, 2015, 2016, 2017
2.	Vector Groups	2005, 2008, 2015, 2016
3.	Per Unit Impedance	2001, 2004, 2010
4.	Efficiency	2004, 2018