

## **UNIT 2: ELECTRICAL MACHINES**

### **Two-Mark Questions:**

- 1. What is the principle of operation of a DC motor?**
- 2. Describe the construction of a DC motor.**
- 3. What is the significance of the armature reaction in a DC motor?**
- 4. State the function of a commutator in a DC motor.**
- 5. How does a DC generator work?**
- 6. Explain the working principle of a transformer.**
- 7. What is the difference between a step-up and a step-down transformer?**
- 8. What is the role of the core in a transformer?**
- 9. Describe the working principle of an induction motor.**
- 10. What is the purpose of a capacitor in a single-phase induction motor?**
- 11. What is the difference between a squirrel-cage and a wound rotor induction motor?**
- 12. Explain the significance of slip in an induction motor.**
- 13. State the applications of a DC motor.**
- 14. What is the difference between a synchronous motor and an induction motor?**
- 15. Describe the construction of a single-phase induction motor.**
- 16. What are the different types of winding in a transformer?**
- 17. What is the purpose of the shunt field winding in a DC motor?**
- 18. What are the losses in a transformer?**
- 19. Explain the function of the rotor in a synchronous motor.**
- 20. What is the significance of the efficiency of an induction motor?**
- 21. What are the advantages of a three-phase induction motor over a single-phase motor?**
- 22. How does the speed of a DC motor vary with load?**
- 23. What is the role of a starter in a motor?**
- 24. Why are induction motors preferred in industrial applications?**

25. Explain the term "synchronous speed" in an induction motor.

**Problems:**

1. **Problem 1:**

A 10 HP, 240 V DC motor is running at 1200 rpm. Calculate the armature current when the back EMF is 200 V.

2. **Problem 2:**

A transformer has a primary voltage of 220 V, and the secondary voltage is 110 V. If the primary current is 2 A, calculate the secondary current assuming 100% efficiency.

3. **Problem 3:**

In a three-phase induction motor, the frequency is 60 Hz. Calculate the synchronous speed for a 4-pole motor.

4. **Problem 4:**

A single-phase induction motor has a rated current of 5 A and runs on a 230 V supply. Calculate the input power to the motor.

5. **Problem 5:**

A 220 V DC generator has an armature resistance of  $0.5 \Omega$  and a load current of 10 A. Calculate the terminal voltage of the generator.