

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/  
COMMERCIAL PRACTICE , APRIL – 2023**

**ELECTRICAL TECHNOLOGY**

(Maximum Marks : 100)

(Time : 3 hours)

**PART – A**  
(Maximum Marks : 10)

Marks

**I.** Answer **all** questions in one or two sentences. Each question carries 2 marks.

1. Define the inductive reactance of an inductor.
2. Write any two expressions for a sinusoidal AC current  $i$ .
3. What are the expressions for the primary and secondary **e m f s** of a single phase ideal transformer?
4. What is meant by cumulative compound DC motor?
5. List any two applications of universal motors.

(5x2=10)

**PART – B**  
(Maximum Marks : 30)

**II.** Answer any **five** of the following questions. Each question carries 6 marks.

1. Draw AC circuits and vector diagrams, if it contains  
(i) Resistor only (ii) Pure Inductor only (iii) Pure Capacitor only.
2. Write and mark the instantaneous value, average value, RMS value and the maximum value for a sinusoidal alternating voltage waveform.
3. Derive the **e m f** equation of a single phase transformer.
4. What is armature reaction and what are the effects of armature reaction in DC generators?
5. Draw the schematic of a 3-point starter for a DC motor.
6. Justify the importance of rotating magnetic field in a 3-phase induction motor.
7. Explain the working principle of a universal motor.

(5x6=30)

**PART – C**  
(Maximum Marks : 60)  
(Answer **one full** question from each unit. Each full question carries 15 marks)

**UNIT – I**

**III.** (a) Illustrate and explain plate earthing. (8)

(b) A resistance of **10  $\Omega$**  and a capacitance of **200  $\mu\text{F}$**  is connected in series to an AC supply of  $v = 200 \text{ Sin } 314t \text{ V}$ . Calculate the current, power and power factor of the circuit. (7)

OR

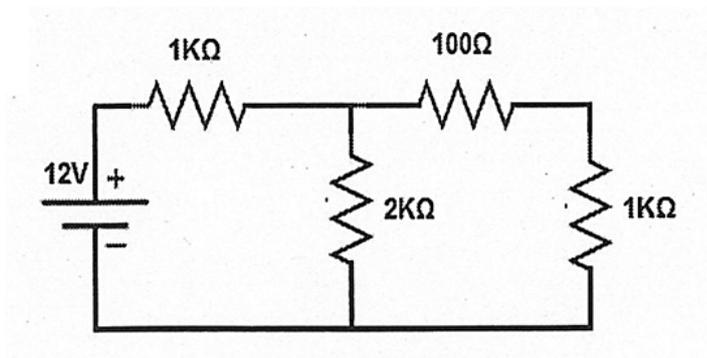
- IV. (a) Derive the expressions for impedance, current and power for a **series R-L-C** circuit in AC. (7)
- (b) A resistance of **50Ω**, inductance of **0.015H** and a capacitance of **250 μF** are connected in series across a 230V, 50Hz supply. Find the power and power factor of the circuit. (8)

UNIT – II

- V. (a) State and explain Superposition theorem. (8)
- (b) List different types of transformers based on construction, application, supply system, windings, installation etc. (7)

OR

- VI. (a) Find the voltage across resistor 1kΩ using Thevni's theorem in the diagram shown. (8)



- (b) What is the difference between ideal transformer and practical transformer? Briefly explain the different losses in a transformer. (7)

UNIT –III

- VII. (a) Explain the working principle of DC generators. (8)
- (b) Compare DC motors based on types, speed and applications. (7)

OR

- VIII. (a) Justify the significance of back e m f in DC motors. (7)
- (b) Classify DC generators based on field connections. (8)

UNIT – IV

- IX. (a) Why single phase AC motors are not said to be self starting? Explain capacitor-start method in single phase AC motors. (8)
- (b) Explain the working principle of a Permanent Magnet type stepper motor. (7)

OR

- X. (a) Derive the e m f equation of an alternator. (7)
- (b) What is the working principle of AC Servomotors? Explain in brief. (8)

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