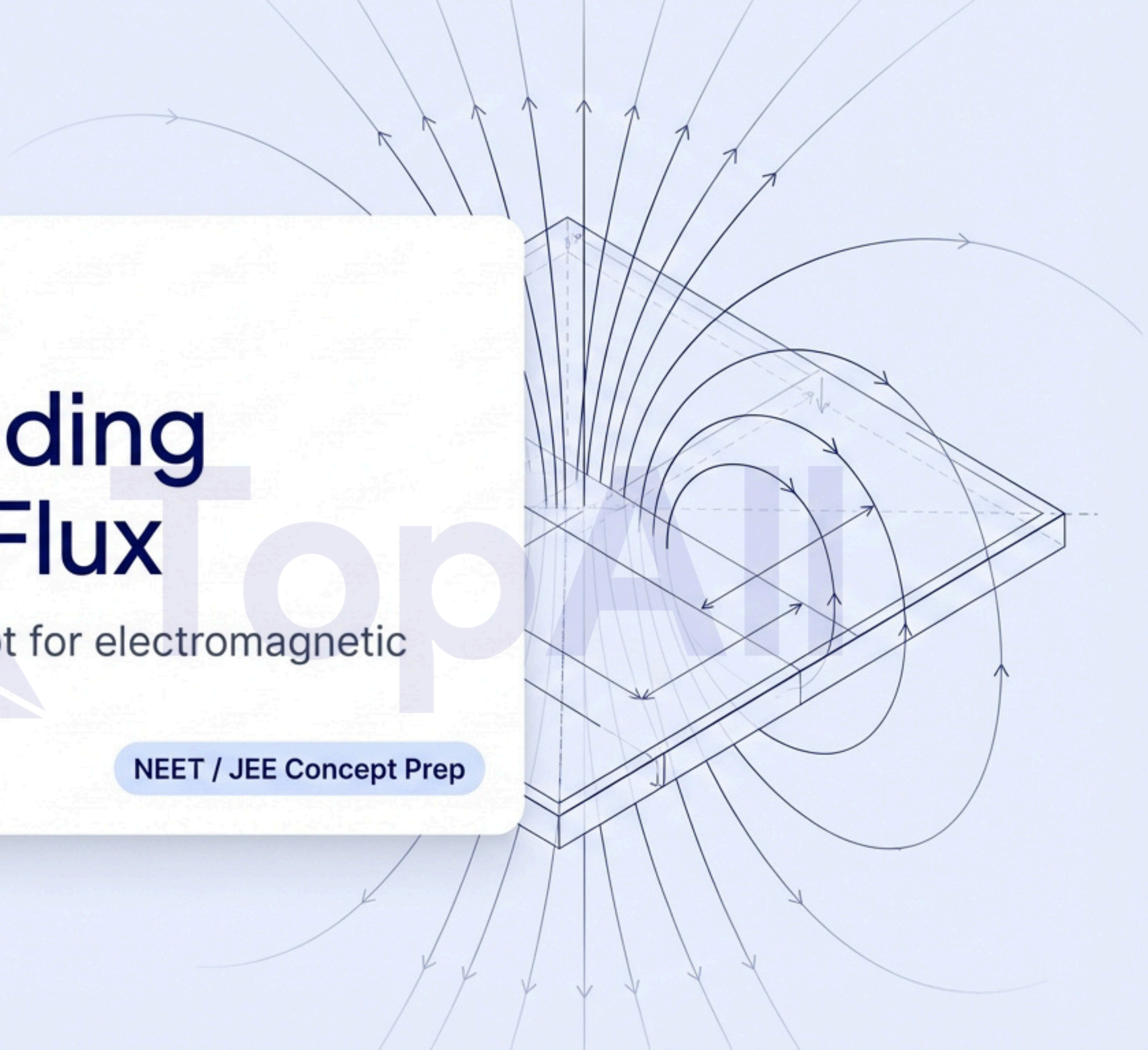


CLASS 12 PHYSICS | CHAPTER 6

# Understanding Magnetic Flux

The foundational concept for electromagnetic induction.

NEET / JEE Concept Prep



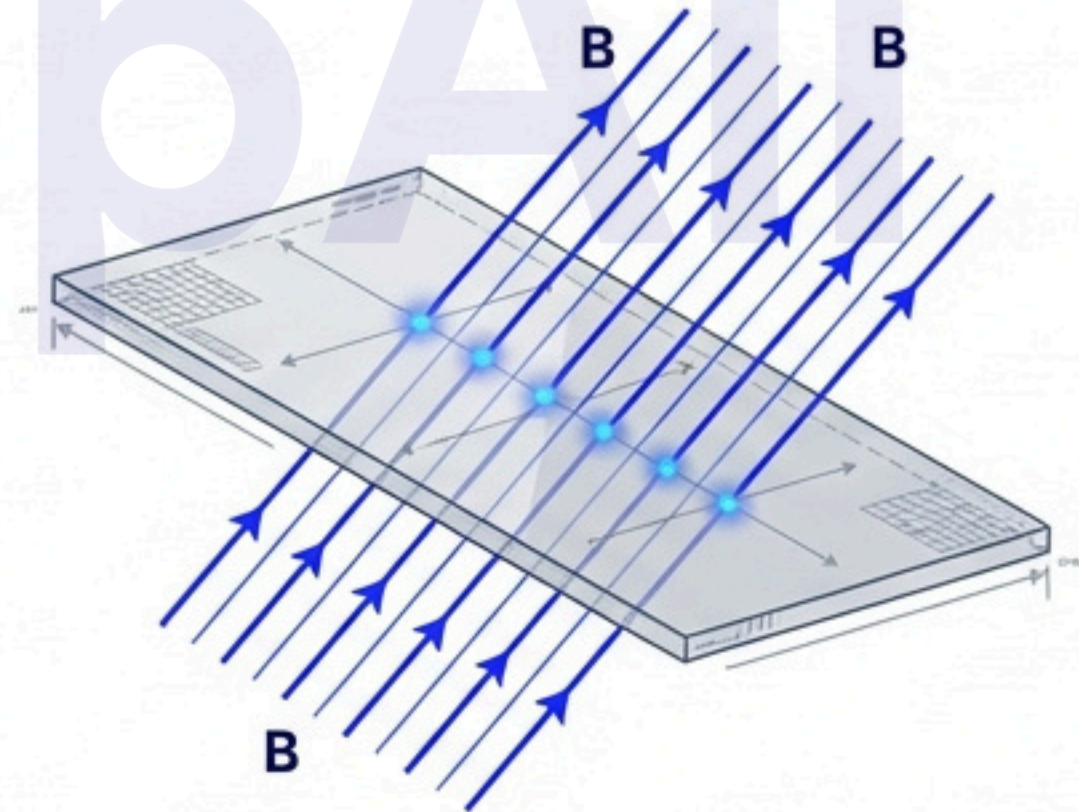
## The Analogy: Catching Rain



### CONCEPT

## What is Magnetic Flux?

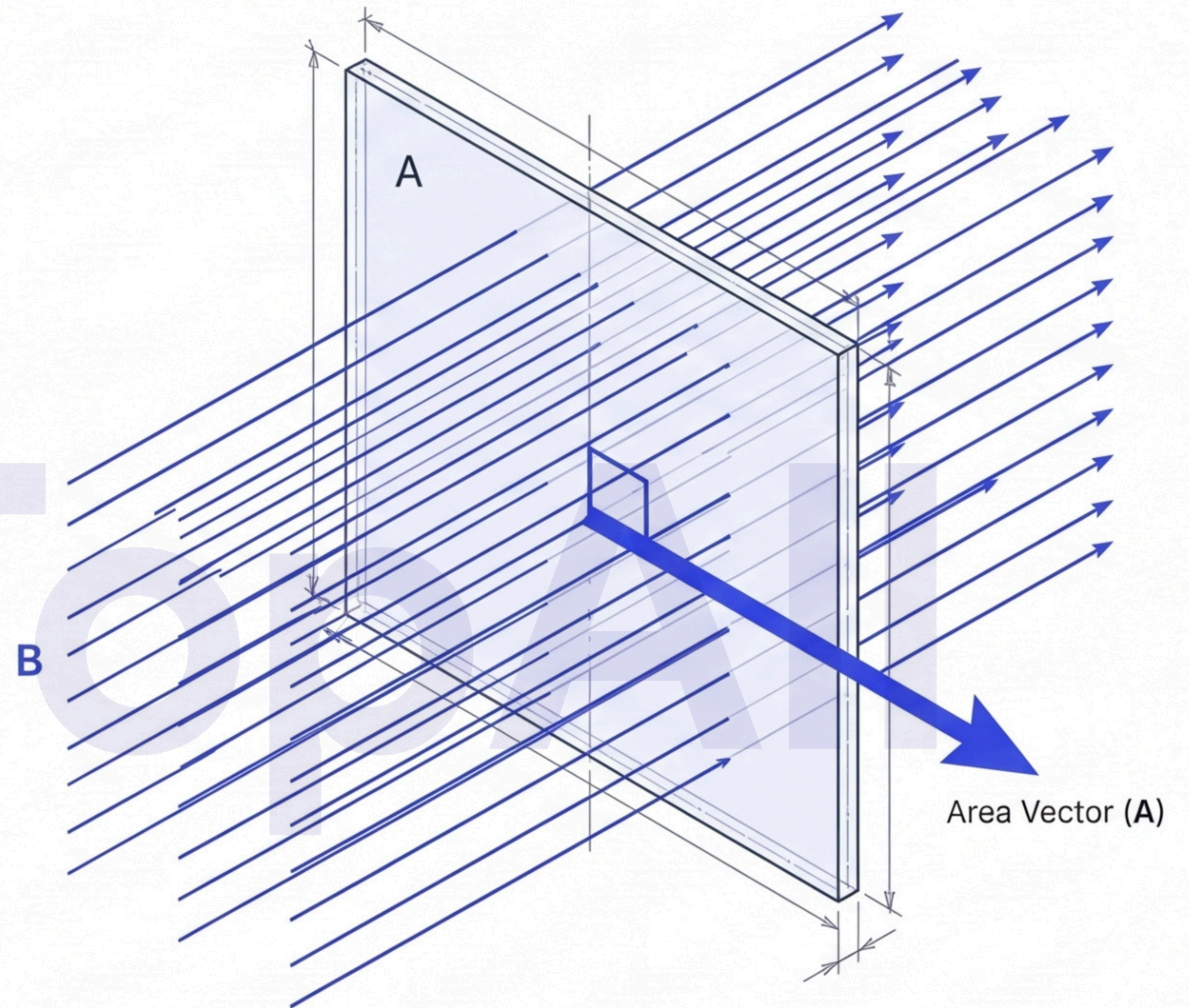
- It is a measure of the total number of magnetic field lines crossing a specific surface area.
- Think of catching rain in a bucket: the amount of water you catch depends on the size of the opening and how it is tilted.
- In physics, it links the magnetic field ( $B$ ) with the surface geometry.



## KEY GEOMETRY

# Defining the Area Vector

- To calculate flux, we must treat area as a vector, not just a scalar number.
- Direction: The area vector always points strictly perpendicular (normal) to the surface.
- Magnitude: Equal to the total surface area of the plane.





# You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

**Practice Now**

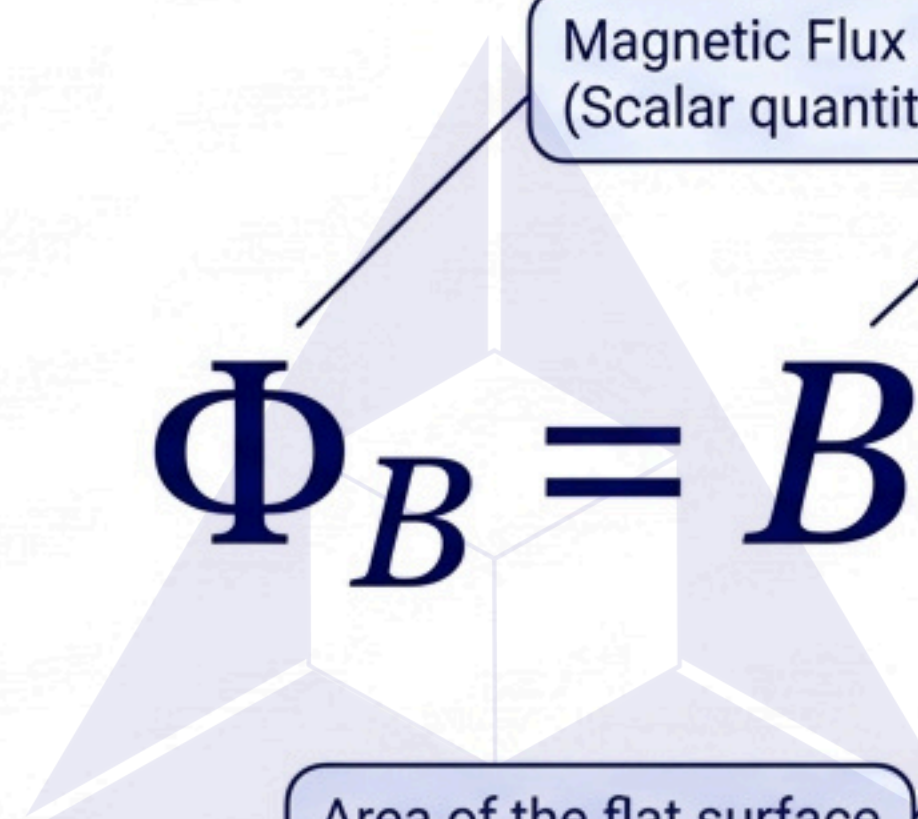


At [prep.topall.app](https://prep.topall.app)

## Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter




$$\Phi_B = B \cdot A = BA \cos\theta$$

Magnetic Flux  
(Scalar quantity)

Uniform Magnetic  
Field magnitude

Area of the flat surface

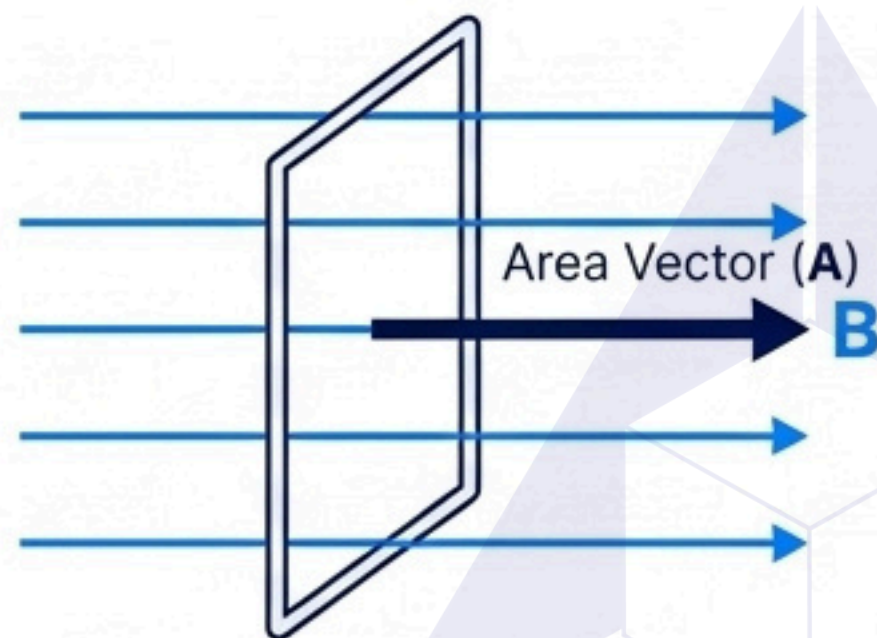
Angle strictly between the field  
(**B**) and the Area Vector (**A**)

SI UNIT

Unit: weber (Wb) or tesla  
meter squared ( $T\ m^2$ ).

# How Angle Changes Flux

## Maximum Flux

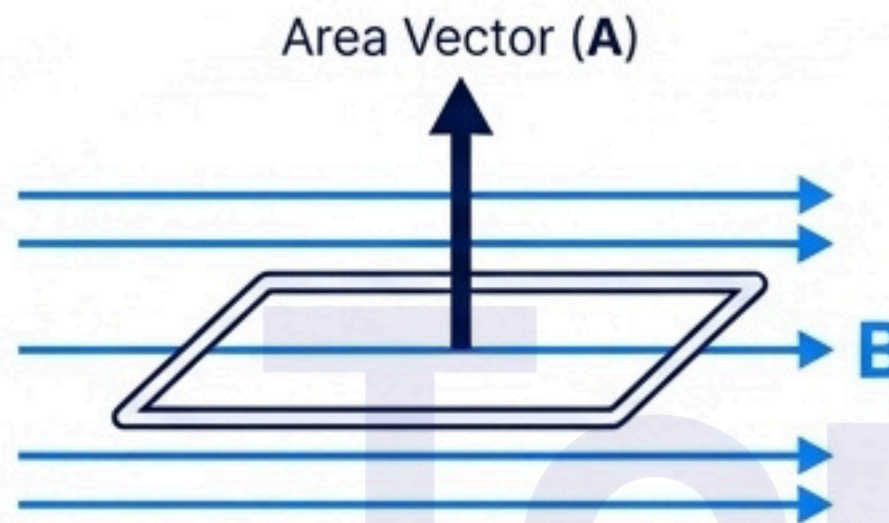


Plane is perpendicular to **B**.

$$\theta = 0^\circ \rightarrow \cos(0^\circ) = 1$$

$$\Phi_B = BA$$

## Zero Flux

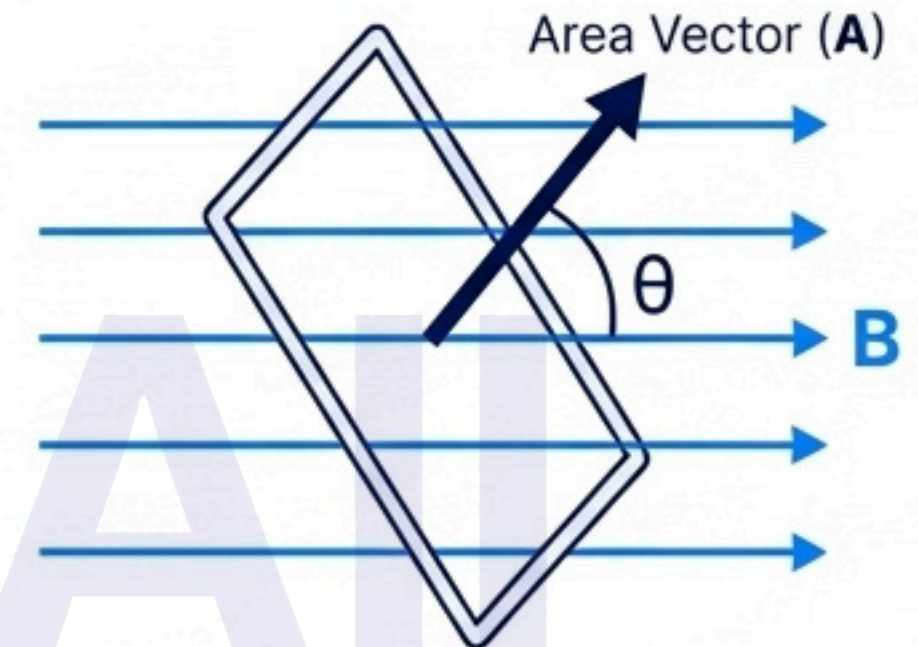


Plane is parallel to **B**.

$$\theta = 90^\circ \rightarrow \cos(90^\circ) = 0$$

$$\Phi_B = 0$$

## Partial Flux



Plane is tilted at an arbitrary angle.

$$0^\circ < \theta < 90^\circ$$

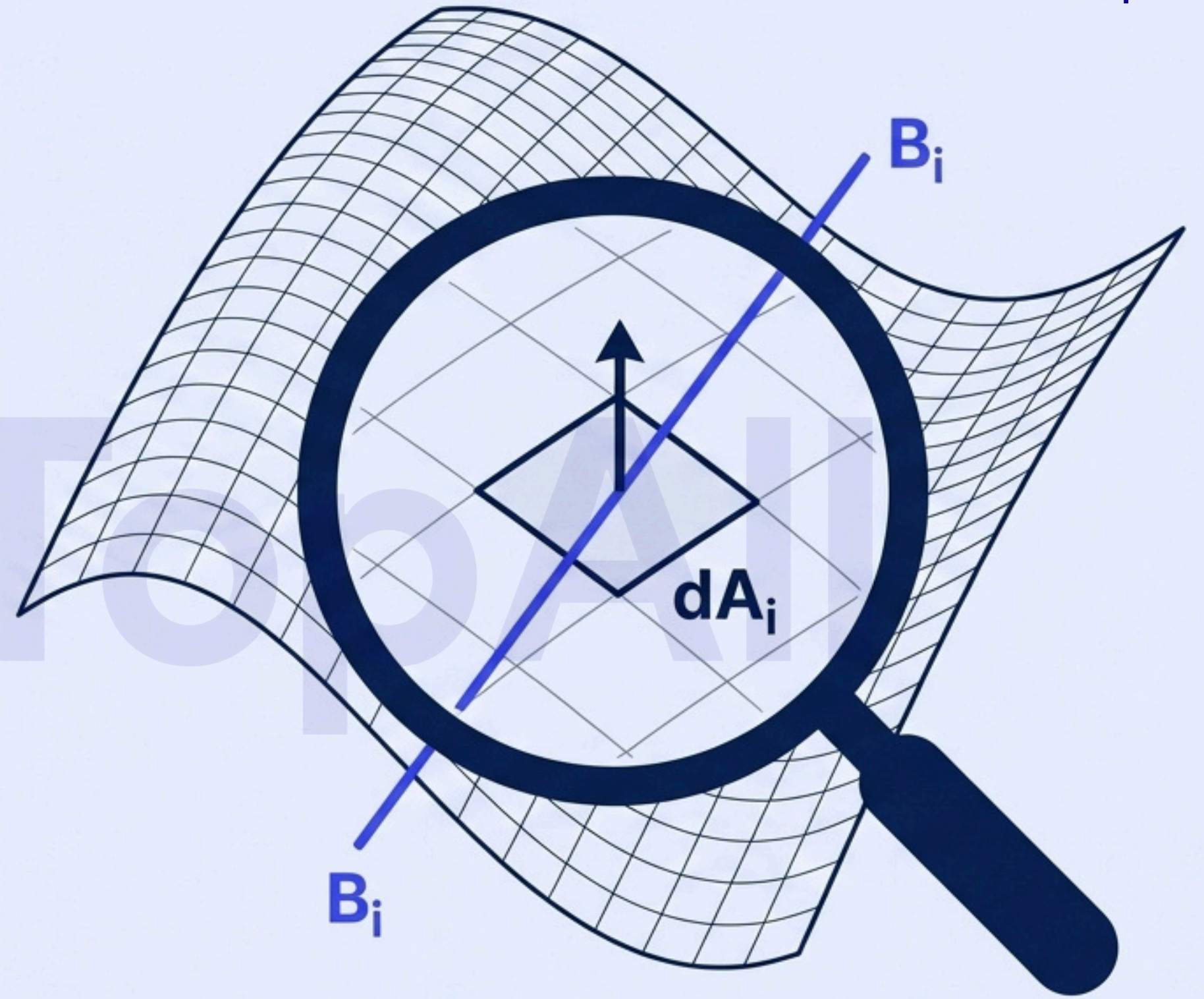
$$\Phi_B = BA \cos\theta$$

## ADVANCED APPLICATION

### The Summation Approach

- When  $B$  changes across a surface, or the surface is curved, Eq 6.1 isn't enough.
- The Fix: Break the surface into tiny, flat area elements ( $dA_i$ ).
- Calculate the microscopic flux ( $d\Phi = B \cdot dA$ ) for each element.
- Sum them all together:

$$\Phi_B = \sum B_i \cdot dA_i \quad (\text{Eq. 6.2})$$



# Section Summary Plus Jakarta Sans

## KEY TAKEAWAYS

- ✓ Magnetic flux ( $\Phi_B$ ) measures the magnetic field passing through an area. It is a scalar quantity measured in webers (Wb).
- ✓ Area is a vector. It always points perpendicular to the surface.
- ✓ For a flat surface in a uniform field:  $\Phi_B = BA \cos\theta$ .
- ✓ For curved surfaces, flux is the summation of tiny area elements ( $d\Phi = B \cdot d\vec{A}$ ).

Try Chapter 6 MCQs Next →



# You've Learned the Theory.

## Now Let's Test It.

Reading notes gets you knowledge.

**Practicing MCQs gets you marks.**

**That's exactly what TopAll Pro is built for.**

**Try TopAll Pro Now**

### What TopAll Pro Does Differently

-  **Stuck? Snap it. Solve it. — Doubts AI**  
Photo → step-by-step solution in seconds, 24/7
-  **Your AI Coach finds your blind spots**  
Concept-level weakness detection — not just chapter-level
-  **4.5 Lakh+ questions. Never run out.**  
13× more content than any other prep app in India
-  **Build your own test in 60 seconds**  
Pick a chapter, set difficulty — AI does the rest instantly.
-  **AI Recommendation that helps you improve**  
AI Recommendation Analysis your Tests and tell you where you need to improve.



**Practice the moment you finish studying**  
Jump in while the concept is still fresh in your head

**4.5L+**  
MCQs

**1.5L+**  
Students

**AI Powered**  
In-Depth Analysis