EXAM PAPERS PRACTICE

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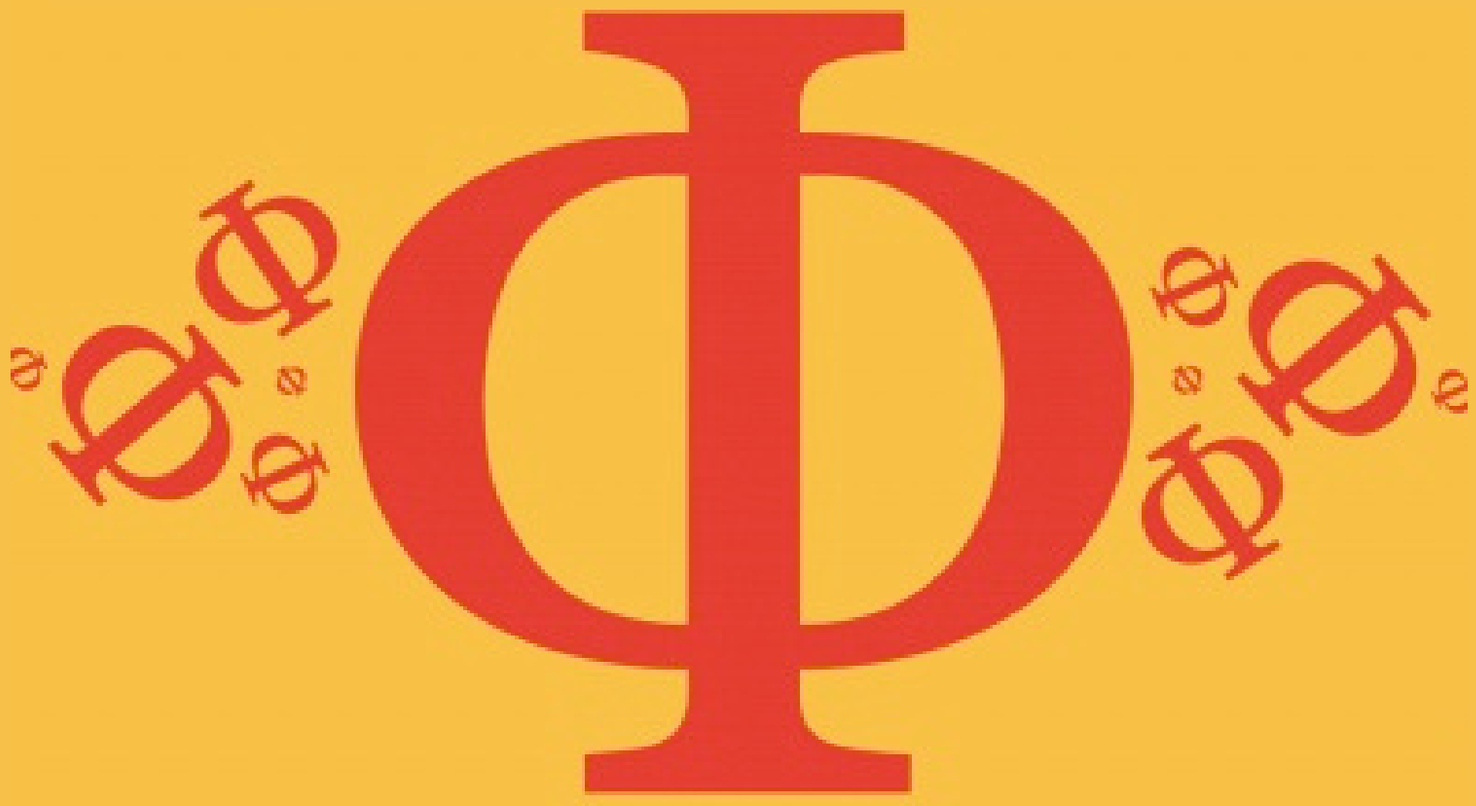
11.1 Electromagnetic Induction

Easy



PHYSICS

IB HL

EXAM PAPERS PRACTICE

11.1 Electromagnetic Induction

Question Paper

Course	DP IB Physics
Section	11. Electromagnetic Induction (HL only)
Topic	11.1 Electromagnetic Induction
Difficulty	Easy

Time allowed: 20

Score: /10

Percentage: /100

Question 1

A coil of wire having a large number of turns is moved relative to a fixed magnetic field.

Which line correctly outlines the magnitude and direction of the e.m.f. which is generated?

	e.m.f. is proportional to	direction of e.m.f.
A.	rate of change of magnetic flux linkage	opposes the change making it
B.	change of the magnetic flux through the coil	reinforces the change making it
C.	rate of change of magnetic flux linkage	opposes the change making it
D.	change of the magnetic flux through the coil	reinforces the change making it

[1 mark]

Question 2

Magnetic flux and magnetic flux linkage sound similar but have completely different meanings.

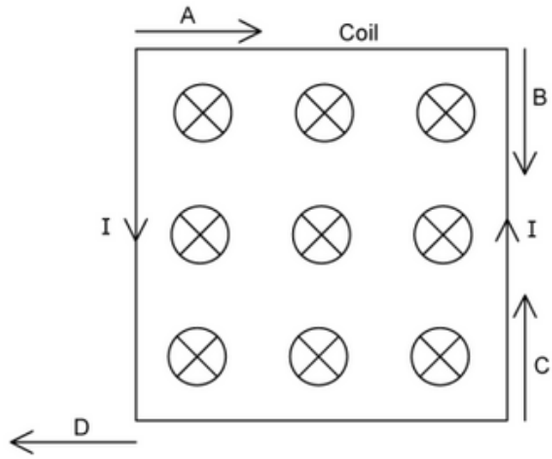
Which line is correct?

	Magnetic flux	Magnetic flux linkage
A.	the number of magnetic field lines through a given area	magnetic flux multiplied by number of turns in the coil
B.	the number of magnetic field lines through a given area	magnetic field strength multiplied by number of turns in the coil
C.	the strength of the magnetic field	magnetic flux multiplied by number of turns in the coil
D.	the strength of the magnetic field	magnetic field strength multiplied by number of turns in the coil

[1 mark]

Question 3

A square coil of conducting wire is placed in a uniform magnetic field which is directed into the page. The current in the coil flows anti-clockwise as seen from above.



Which force acting on the coil is correct at its specific location?

[1 mark]

Question 4

Faraday's law of electromagnetic induction states that the electromotive force (e.m.f.) induced in a conductor is proportional to which quantity?

A. Change of magnetic flux density.

B. Rate of change of magnetic flux density.

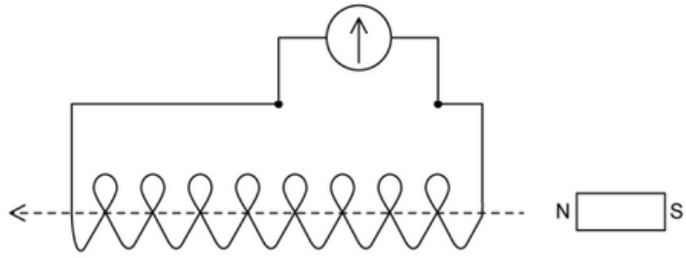
C. Change of magnetic flux linkage.

D. Rate of change of magnetic flux linkage.

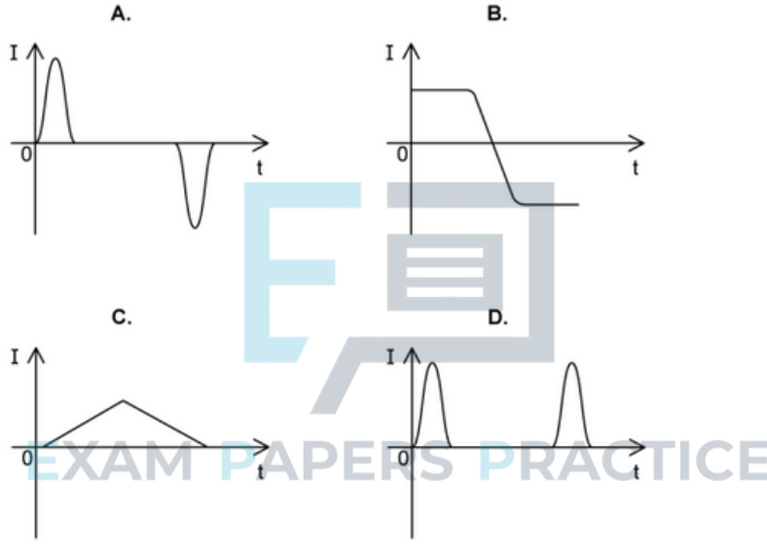
[1 mark]

Question 1

A bar magnet is passed at a steady speed through a solenoid. The solenoid is much longer than the magnet. A galvanometer is connected to the solenoid.



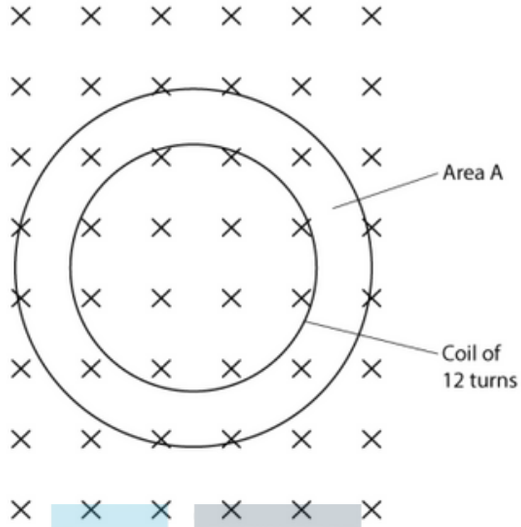
Which graph correctly shows the likely variation of current registered by the galvanometer *I*, with time *t*?



Question 6

A uniform magnetic field of flux density *B* passes normally through a plane area *A*.

A coil of 12 turns of wire lies in this plane. Each turn has an area 0.5 A



What is the magnetic flux linkage for the coil?

A. 6 Wb turns

B. 6 BA Wb turns

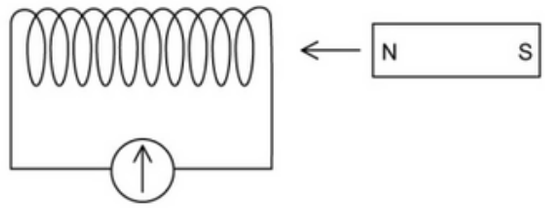
C. 24 Wb turns

D. 24 BA Wb turns

[1 mark]

Question 7

The north pole of a bar magnet is pushed into a solenoid inducing a maximum current of 10 units with a deflection to the left, as measured on a galvanometer.



The south pole of the same magnet is pushed into the other end of the same solenoid at twice the speed.

What is the maximum expected deflection on the galvanometer?

A. ≤ 10 units to the left

B. > 10 units to the left

C. ≤ 10 units to the right

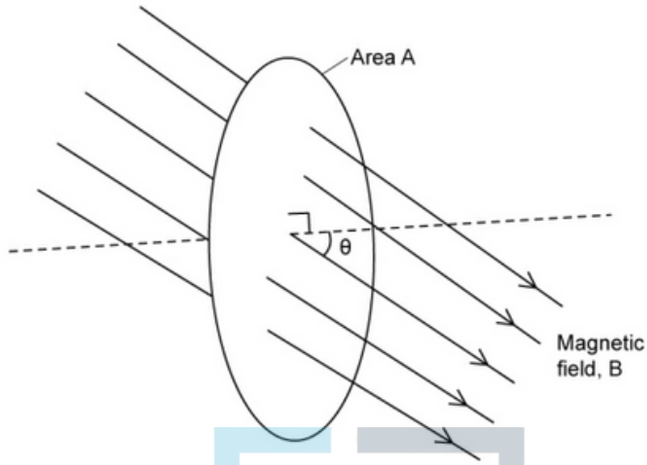
D. > 10 units to the right

[1 mark]

Question 8

When magnetic field lines are not perpendicular to a plane area A, the equation for the relevant component of magnetic flux density is

$$\Phi = BA\cos(\theta)$$



Which line in the table correctly identifies the situation and explanation for the rotating coil when magnetic flux density is at a maximum?

	angle θ	explanation
A.	0°	cos 0 = 1
B.	0°	sin 0 = 1
C.	90°	cos 90 = 1
D.	90°	sin 90 = 1

[1 mark]

Question 9

A loop of area $A = 0.25\ m^2$ is in a constant magnetic field of $B = 0.40$ T. What is the magnetic flux through the loop when the loop is perpendicular to the field?

A. 0 Wb

B. 0.10 Wb

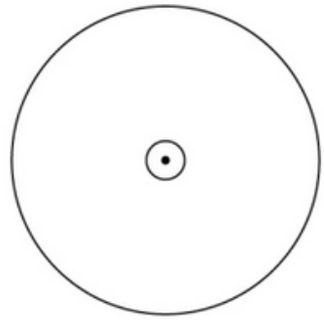
C. 0.25 Wb

D. 0.40 Wb

[1 mark]

Question 10

A magnetic field of uniformly decreasing magnitude is directed out of the plane of the page as shown and a loop of thin copper wire lies on the plane of the page, so that the field and the wire are perpendicular to each other.



The wire is moved so that the angle between the wire and the plane of the loop is reduced. Which line correctly describes the direction and magnitude of the induced current in the wire?

	direction	magnitude
A.	clockwise	constant
B.	clockwise	varies
C.	anti-clockwise	constant
D.	anti-clockwise	varies

[1 mark]