

Easy

Assistant Engineer (Electrical), Class 2025

Building Department

Calculate the emf when the flux is given by $3\sin t + 5\cos t$.

A

 $3\cos t - 5\sin t$

B

 $3\cos t + 5\sin t$

Correct

C

 $3\sin t - 5\cos t$

D

 $3\cos t + 5\sin t$

Correct Answer: B

Full Detailed Explanation

Concept & Reasoning The induced emf polarity is governed by Lenz's law, represented by the minus sign in Faraday's law. Differentiate each term of flux with respect to time, then apply the negative sign to the entire derivative. The derivative of $\sin t$ is $\cos t$ and of $\cos t$ is $-\sin t$. Thus $\frac{d\phi}{dt} = 3\cos t - 5\sin t$ and $e = -3\cos t + 5\sin t$.
How to Solve It in the Exam Differentiate first, apply Lenz's minus sign last.
Important Exam Point Keep track of both the derivative sign of $\cos t$ and Faraday's leading minus sign.
Related Revision Path This question sits in the revision path **Electromagnetic Fields** → **Electromagnetic Induction** → **Faraday's Law**.

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