TOPIC
Mathematics – Section I – Question 21

QUESTION
The cross product of $\vec{u}$ and $\vec{v}$

$$\vec{u} = 3i + 5j + 7k$$
$$\vec{v} = 11i + 13y + 17k$$

is

(A) $-i - 26j - 16k$
(B) $33i + 65j + 119k$
(C) $-6i + 26j - 16k$
(D) ???????????

HINT
Write the cross product of two vectors in determinant form.

SOLUTION
The cross product of two vectors $u = (u_x, u_y u_z)$ and $v = (v_x, v_y, v_z)$ in determinant form is

$$\begin{aligned} u \times v &= \begin{vmatrix} i & j & k \\ u_x & u_y & u_z \\ v_x & v_y & v_z \end{vmatrix} \\ &= \begin{vmatrix} i & j & k \\ 3 & 5 & 7 \\ 11 & 13 & 17 \end{vmatrix} \\ &= i\begin{vmatrix} 5 & 7 \\ 13 & 17 \end{vmatrix} - j\begin{vmatrix} 3 & 7 \\ 11 & 17 \end{vmatrix} + k\begin{vmatrix} 3 & 5 \\ 11 & 13 \end{vmatrix} \\ &= i(5\times 17 - 7\times 13) - j(3\times 17 - 7\times 11) + k(3\times 13 - 5\times 11) \\ &= -6i + 26j - 16k \end{aligned}$$

ANSWER
(C)

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