**TOPIC**
Mathematics

**QUESTION**
The form of the particular solution to the ordinary differential equation
\[ \frac{d^2 y}{dx^2} - 4 \frac{dy}{dx} + 4 y = e^{2x} + \sin x \]
\[ y(0) = 5 \]
\[ \frac{dy}{dx} (0) = 6 \]
is
(A) \( Ax^2 e^{2x} + B \sin x + C \cos x \)
(B) \( Ae^{2x} + B \sin x + C \cos x \)
(C) \( Ax^2 e^{2x} + B \sin x \)
(D) \( Ae^{2x} + B \sin x \)

**HINT**
The characteristic equation has repeated roots. The particular part of the solution will have the form of the right hand side and its derivatives, unless they have the form of the homogeneous part of the solution.

The homogeneous part of the solution is of the form
\[ y_h = k_1 e^{2x} + k_2 x e^{2x} \]
Corresponding to \( e^{2x} \) forcing function, the particular part would be
\[ y_p = Ax^2 e^{2x} \]

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If you disagree with the way the question is posed or disagree with the correct answer, please let me know.