

Q.1-2 This question concerns the applicability of statements to

(a) the wave equation for an ideal string,

(b) the time-dependent Schrödinger equation for a free particle in one dimension.

In each case, choose the **ONE** option from the key that describes the applicability of the statement in question.

- (i) All solutions can be expressed in the separated form $f(x, t) = X(x)T(t)$. ☐
- (ii) If $f_1(x, t)$ and $f_2(x, t)$ are solutions, then $Af_1(x, t) + Bf_2(x, t)$ is also a solution, where A and B are constants. ☐
- (iii) A knowledge of the solution at time $t = 0$, $f(x, 0)$, is sufficient to determine the solution $f(x, t)$ at some later time t . ☐
- (iv) Wave packets propagate without change of shape. ☐

KEY for Q.1-2 (i) to (iv)

- A The statement is false for both equations.
- B The statement is true for the wave equation for an ideal string, but not for the time-dependent Schrödinger equation.
- C The statement is true for the time-dependent Schrödinger equation, but not for the wave equation for an ideal string.
- D The statement is true for both equations.
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