PhysicsByAaryan

CSIR NET . GATE . JEST . BARC - Physics

Partial Differential Equations - CSIR NET Physics PYQs

Mathematical Physics . All PYQs (2015-2025) with answer key

2 questions . Answer key included

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Q1. [June 2015] . 5.0 marks

Mathematical Physics > Partial Differential Equations

CSIR NET	2015 June	5 M

Let $f(x,t)$ be a solution of the wave equation $\frac{\partial^2 f}{\partial t^2} = v^2 \frac{\partial^2 f}{\partial x^2}$ in 1 -dimension. If at $t = 0, f(x,0) = e^{-x^2}$ and $\frac{\partial f}{\partial t}(x,0) = 0$ for all x, then $f(x,t)$ for all future times $t > 0$ is described by

1. $e^{-(x^2 - v^2 t^2)}$
2. $e^{-(x-vt)^2}$
3. $\frac{1}{4} e^{-(x-vt)^2} + \frac{3}{4} e^{-(x+vt)^2}$
4. $\frac{1}{2}\left[e^{-(x-vt)^2} + e^{-(x+vt)^2}\right]$

Q2. [Dec 2016] . 5.0 marks

Mathematical Physics > Partial Differential Equations

CSIR NET	2016 Dec	5M

Let $f(x,t)$ be a solution of the heat equation $\frac{\partial f}{\partial t} = D\frac{\partial^2 f}{\partial x^2}$ in one dimension. The initial condition at $t = 0$ is $f(x,0) = e^{-x^2}$ for $-\infty < x < \infty$. Then for all $t > 0, f(x,t)$ is given by [Useful integral: $\int_{-\infty}^{\infty} dx e^{-\alpha x^2} = \sqrt{\pi/\alpha}$.]

1. $\frac{1}{\sqrt{1+Dt}} e^{-\frac{x^2}{1+Dt}}$
2. $\frac{1}{\sqrt{1+2Dt}} e^{-\frac{x^2}{1+2Dt}}$
3. $\frac{1}{\sqrt{1+4Dt}} e^{-\frac{x^2}{1+4Dt}}$
4. $e^{-\frac{x^2}{1+Dt}}$

Answer Key

2 questions . Subject and topic for quick revision

Q. No	Subject	Topic	Answer
Q1	Mathematical Physics	Partial Differential Equations	**4**
Q2	Mathematical Physics	Partial Differential Equations	**3**

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