PhysicsByAaryan

CSIR NET . GATE . JEST . BARC - Physics

Green Function - CSIR NET Physics PYQs

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

4 questions . Answer key included

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Q1. [June 2017] . 5.0 marks

Mathematical Physics > Green Function

CSIR NET	2017 June	5M

The Green's function satisfying

$$\frac{d^2}{dx^2}g(x,x_0)=\delta(x-x_0)$$

with the boundary conditions $g(-L,x_0)=0=g(L,x_0)$, is

1. $\begin{cases}\frac{1}{2L}(x_0-L)(x+L), & -L\le x<x_0\\ \frac{1}{2L}(x_0+L)(x-L), & x_0\le x\le L\end{cases}$

2. $\begin{cases}\frac{1}{2L}(x_0+L)(x+L), & -L\le x<x_0\\ \frac{1}{2L}(x_0-L)(x-L), & x_0\le x\le L\end{cases}$

3. $\begin{cases}\frac{1}{2L}(L-x_0)(x+L), & -L\le x<x_0\\ \frac{1}{2L}(x_0+L)(L-x), & x_0\le x\le L\end{cases}$

4. $\frac{1}{2L}(x-L)(x+L), -L\le x\le L$

Q2. [Dec 2018] . 5.0 marks

Mathematical Physics > Green Function

CSIR NET	2018 Dec	5M

The Green's function $G(x,x')$ for the equation $\frac{d^2y(x)}{dx^2} = f(x)$, with the boundary values $y(0) = 0$ and $y(1) = 0$, is

1. $G(x,x') = \begin{cases} \frac{1}{2}x(1-x'), & 0 < x < x' < 1 \\ \frac{1}{2}x'(1-x) & 0 < x' < x < 1 \end{cases}$

2. $G(x,x') = \begin{cases} x(x'-1), & 0 < x < x' < 1 \\ x'(1-x) & 0 < x' < x < 1 \end{cases}$

3. $G(x,x') = \begin{cases} -\frac{1}{2}x(1-x'), & 0 < x < x' < 1 \\ \frac{1}{2}x'(1-x) & 0 < x' < x < 1 \end{cases}$

4. $G(x,x') = \begin{cases} x(x'-1), & 0 < x < x' < 1 \\ x'(x-1) & 0 < x' < x < 1 \end{cases}$

Q3. [June 2018] . 5.0 marks

Mathematical Physics > Green Function

CSIR NET	2018 June	5M

The Green's function $G(x,x')$ for the equation $\frac{d^2y(x)}{dx^2}+y(x)=f(x)$, with the boundary values $y(0)=y\left(\frac{\pi}{2}\right)=0$, is

1. $G(x,x') = \begin{cases} x\left(x'-\frac{\pi}{2}\right), & 0<x<x'<\frac{\pi}{2} \\ \left(x-\frac{\pi}{2}\right)x', & 0<x'<x<\frac{\pi}{2} \end{cases}$

2. $G(x,x') = \begin{cases} -\cos x' \sin x, & 0<x<x'<\frac{\pi}{2} \\ -\sin x' \cos x, & 0<x'<x<\frac{\pi}{2} \end{cases}$

3. $G(x,x') = \begin{cases} \cos x' \sin x, & 0<x<x'<\frac{\pi}{2} \\ \sin x' \cos x, & 0<x'<x<\frac{\pi}{2} \end{cases}$

4. $G(x,x') = \begin{cases} x\left(\frac{\pi}{2}-x'\right), & 0<x<x'<\frac{\pi}{2} \\ x'\left(\frac{\pi}{2}-x\right), & 0<x'<x<\frac{\pi}{2} \end{cases}$

Q4. [June 2020] . 5.0 marks

Mathematical Physics > Green Function

CSIR NET	2020 June	5M

The Green's function for the differential equation $\frac{d^2x}{dt^2} + x = f(t)$, satisfying the initial conditions $x(0) = \frac{dx}{dt}(0) = 0$ is

$$G(t,\tau) = \begin{cases} 0 & \text{for} \quad 0 < t < \tau \\ \sin(t-\tau) & \text{for} \quad t > \tau \end{cases}$$

The solution of the differential equation when the source $f(t) = \theta(t)$ (the Heaviside step function) is

1. $\sin t$
2. $1 - \sin t$
3. $1 - \cos t$
4. $\cos^2 t - 1$

Answer Key

4 questions . Subject and topic for quick revision

Q. No	Subject	Topic	Answer
Q1	Mathematical Physics	Green Function	**1**
Q2	Mathematical Physics	Green Function	**4**
Q3	Mathematical Physics	Green Function	**2**
Q4	Mathematical Physics	Green Function	**3**

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