

PhysicsByAaryan

CSIR NET . GATE . JEST . BARC - Physics

Basic Mathematics - CSIR NET Physics PYQs

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

9 questions . Answer key included

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Q1. [Dec 2015] . 3.5 marks

Mathematical Physics > Basic Mathematics

CSIR NET	2015 Dec	3.5 M
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If $y = \frac{1}{\tanh(x)}$, then x is

1. $\ln \left(\frac{y+1}{y-1} \right)$

2. $\ln \left(\frac{y-1}{y+1} \right)$

3. $\ln \sqrt{\frac{y-1}{y+1}}$

4. $\ln \sqrt{\frac{y+1}{y-1}}$

Q2. [Dec 2016] . 5.0 marks

Mathematical Physics > Basic Mathematics

CSIR NET	2016 Dec	5M
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A stable asymptotic solution of the equation

$x_{n+1} = 1 + \frac{3}{1+x_n}$ is $x = 2$. If we take $x_n = 2 + \epsilon_n$ and $x_{n+1} = 2 + \epsilon_{n+1}$, where ϵ_n and ϵ_{n+1} are both small, the ratio $\epsilon_{n+1}/\epsilon_n$ is approximately

1. $-\frac{1}{2}$
2. $-\frac{1}{4}$
3. $-\frac{1}{3}$
4. $-\frac{2}{3}$

Q3. [June 2016] . 3.5 marks

Mathematical Physics > Basic Mathematics

CSIR NET	2016 June	3.5M
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The radius of convergence of the Taylor series expansion of the function $\frac{1}{\cosh(x)}$ around $x = 0$, is

1. ∞
2. π
3. $\frac{\pi}{2}$
4. 1

Q4. [Dec 2017] . 3.5 marks

Mathematical Physics > Basic Mathematics

CSIR NET	2017 Dec	3.5M
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Consider the real function $f(x) = 1/(x^2 + 4)$. The Taylor expansion of $f(x)$ about $x = 0$ converges

1. for all values of x
2. for all values of x except $x = \pm 2$
3. in the region $-2 < x < 2$
4. for $x > 2$ and $x < -2$

Q5. [June 2021] . 3.5 marks

Mathematical Physics > Basic Mathematics

CSIR NET	2021 June	3.5M
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The volume of the region common to the interiors of two infinitely long cylinders defined by $x^2 + y^2 = 25$ and $x^2 + 4z^2 = 25$ is best approximated by

1. 225
2. 333
3. 423
4. 625

Q6. [June 2022] . 3.5 marks

Mathematical Physics > Basic Mathematics

CSIR NET	2022 June	3.5M
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The infinite series $\sum_{n=0}^{\infty} (n^2 + 3n + 2)x^n$ evaluated at $x = \frac{1}{2}$, is

1. 16
2. 32
3. 8
4. 24

Q7. [June 2023] . 3.5 marks

Mathematical Physics > Basic Mathematics

CSIR NET	2023 June	3.5M
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The value of the integral $I = \int_0^{\infty} e^{-x} x \sin(x) dx$ is

1. $3/4$
2. $2/3$
3. $1/2$
4. $1/4$

Q8. [Dec 2024] . 3.5 marks

Mathematical Physics > Basic Mathematics

CSIR NET	2024 Dec	3.5M
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Given the sum of the infinite series

$$\frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + \frac{1}{4^4} + \dots = \frac{\pi^4}{90}$$

the sum of the infinite series

$$\frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + \dots$$

would be

1. $\frac{\pi^4}{128}$

2. $\frac{\pi^4}{144}$

3. $\frac{\pi^4}{120}$

4. $\frac{\pi^4}{96}$

Q9. [Dec 2025] . 5.0 marks

Mathematical Physics > Basic Mathematics

CSIR NET	2025 Dec	5M	MMP
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Find the curve that extremizes the functional

$$I(y) = \int_0^1 \left[\left(\frac{dy}{dx} \right)^2 + 12xy \right] dx$$

for the given boundary conditions $y(0) = 0$ and

$$y(1) = 1$$

1. $y = x^3$

2. $y = x^2$

3. $y = 2x^2 - x$

4. $y = 3x^3 - 2x^2$

Answer Key

9 questions . Subject and topic for quick revision

Q. No	Subject	Topic	Answer
Q1	Mathematical Physics	Basic Mathematics	4
Q2	Mathematical Physics	Basic Mathematics	3
Q3	Mathematical Physics	Basic Mathematics	3
Q4	Mathematical Physics	Basic Mathematics	3
Q5	Mathematical Physics	Basic Mathematics	2
Q6	Mathematical Physics	Basic Mathematics	1
Q7	Mathematical Physics	Basic Mathematics	3
Q8	Mathematical Physics	Basic Mathematics	4
Q9	Mathematical Physics	Basic Mathematics	1

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