

PhysicsByAaryan

CSIR NET . GATE . JEST . BARC - Physics

Probability - CSIR NET Physics PYQs

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

18 questions . Answer key included

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Q1. [June 2015] . 5.0 marks

Mathematical Physics > Probability

CSIR NET	2015 June	5 M
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Three real variables a , b and c are each randomly chosen from a uniform probability distribution in the interval $[0,1]$. The probability that $a + b > 2c$ is

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

Q2. [Dec 2016] . 3.5 marks

Mathematical Physics > Probability

CSIR NET	2016 Dec	3.5M
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Consider two radioactive atoms, each of which has a decay rate of 1 per year. The probability that at least one of them decays in the first two years is

1. $\frac{1}{4}$
2. $\frac{3}{4}$
3. $1 - e^{-4}$
4. $(1 - e^{-2})^2$

Q3. [June 2016] . 3.5 marks

Mathematical Physics > Probability

CSIR NET	2016 June	3.5M
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Let X and Y be two independent random variables, each of which follow a normal distribution with the same standard deviation σ , but with means $+\mu$ and $-\mu$, respectively. Then the sum $X + Y$ follows a

1. distribution with two peaks at $\pm\mu$ and mean 0 and standard deviation $\sigma\sqrt{2}$
2. normal distribution with mean 0 and standard deviation 2σ
3. distribution with two peaks at $\pm\mu$ and mean 0 and standard deviation 2σ
4. normal distribution with mean 0 and standard deviation $\sigma\sqrt{2}$

Q4. [June 2017] . 3.5 marks

Mathematical Physics > Probability

CSIR NET	2017 June	3.5M
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The random variable x ($-\infty < x < \infty$) is distributed according to the normal distribution $P(x) =$

$\frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{x^2}{2\sigma^2}}$. The probability density of the random variable $y = x^2$ is

1. $\frac{1}{\sqrt{2\pi\sigma^2 y}} e^{-y/2\sigma^2}$, $0 \leq y < \infty$
2. $\frac{1}{2\sqrt{2\pi\sigma^2 y}} e^{-y/2\sigma^2}$, $0 \leq y < \infty$
3. $\frac{1}{\sqrt{2\sigma^2}} e^{-y/2\sigma^2}$, $0 \leq y < \infty$
4. $\frac{1}{\sqrt{2\pi\sigma^2 y}} e^{-y/\sigma^2}$, $0 \leq y < \infty$

Q5. [June 2017] . 5.0 marks

Mathematical Physics > Probability

CSIR NET	2017 June	5M
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A random variable n obeys Poisson statistics. The probability of finding $n = 0$ is 10^{-6} . The expectation value of n is nearest to

1. 14
2. 10^6
3. e
4. 10^2

Q6. [Dec 2018] . 5.0 marks

Mathematical Physics > Probability

CSIR NET	2018 Dec	5M
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The standard deviation of the following set of data $\{10.0, 10.0, 9.9, 9.9, 9.8, 9.9, 9.9, 9.9, 9.8, 9.9\}$ is nearest to

1. 0.10
2. 0.07
3. 0.01
4. 0.04

Q7. [Dec 2019] . 3.5 marks

Mathematical Physics > Probability

CSIR NET	2019 Dec	3.5M
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A box contains 5 white and 4 black balls. Two balls are packed together at random from the box. What is the probability that these two balls are of different colours?

1. $\frac{1}{2}$
2. $\frac{5}{18}$
3. $\frac{1}{3}$
4. $\frac{5}{9}$

Q8. [June 2019] . 3.5 marks

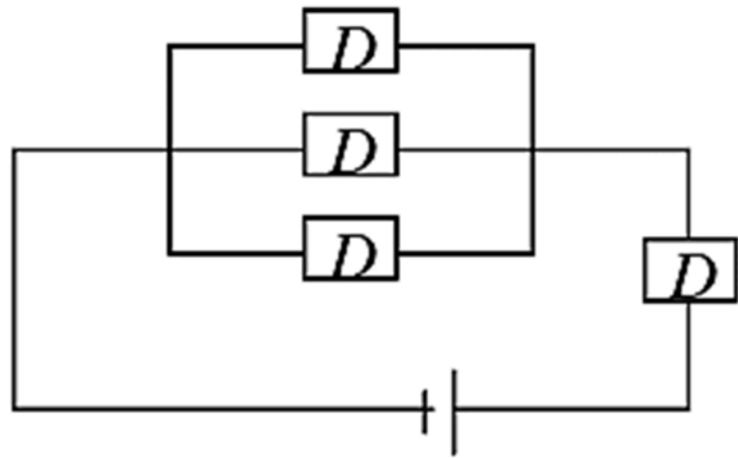
Mathematical Physics > Probability

CSIR NET	2019 June	3.5M
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In the following circuit, each device D may be an insulator with probability p or a conductor with probability $(1 - p)$.

The probability that a non-zero current flows through the circuit is

1. $2 - p - p^3$
2. $(1 - p)^4$
3. $(1 - p)^2 p^2$
4. $(1 - p)(1 - p^3)$



Q9. [June 2020] . 3.5 marks

Mathematical Physics > Probability

CSIR NET	2020 June	3.5M
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A basket consists of an infinite number of red and black balls in the proportion $p: (1 - p)$. Three balls are drawn at random without replacement. The probability of their being two red and one black is a maximum for

1. $p = \frac{3}{4}$

2. $p = \frac{3}{5}$

3. $p = \frac{1}{2}$

4. $p = \frac{2}{3}$

Q10. [June 2021] . 3.5 marks

Mathematical Physics > Probability

CSIR NET	2021 June	3.5M
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A discrete random variable X takes a value from the set $\{-1,0,1,2\}$ with the corresponding probabilities $p(X) = 3/10, 2/10, 2/10$ and $3/10$, respectively. The probability distribution $q(Y) = (q(0), q(1), q(4))$ of the random variable $Y = X^2$ is

1. $\left(\frac{1}{5}, \frac{3}{5}, \frac{1}{5}\right)$
2. $\left(\frac{1}{5}, \frac{1}{2}, \frac{3}{10}\right)$
3. $\left(\frac{2}{5}, \frac{2}{5}, \frac{1}{5}\right)$
4. $\left(\frac{3}{10}, \frac{3}{10}, \frac{2}{5}\right)$

Q11. [June 2022] . 5.0 marks

Mathematical Physics > Probability

CSIR NET	2022 June	5M
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A bucket contains 6 red and 4 blue balls. A ball is taken out of the bucket at random and two balls of the same colour are put back. This step is repeated once more. The probability that the numbers of red and blue balls are equal at the end, is

1. $4/11$
2. $2/11$
3. $1/4$
4. $3/4$

Q12. [June 2023] . 3.5 marks

Mathematical Physics > Probability

CSIR NET	2023 June	3.5M
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A jar J1 contains equal number of balls of red, blue and green colours, while another jar J2 contains balls of only red and blue colours, which are also equal in number. The probability of choosing J1 is twice as large as choosing J2. If a ball picked at random from one of the jars turns out to be red, the probability that it came from

1. $2/3$
2. $3/5$
3. $2/5$
4. $4/7$

Q13. [June 2023] . 5.0 marks

Mathematical Physics > Probability

CSIR NET	2023 June	5M
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A random variable Y obeys a normal distribution

$$P(Y) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left[-\frac{(Y-\mu)^2}{2\sigma^2}\right]$$

The mean value of e^r is

1. $e^{\mu+\frac{\sigma^2}{2}}$
2. $e^{\mu-\sigma^2}$
3. $e^{\mu+\sigma^2}$
4. $e^{\mu-\frac{\sigma^2}{2}}$

Q14. [Dec 2024] . 5.0 marks

Mathematical Physics > Probability

CSIR NET	2024 Dec	5M
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A class has 60% boys and 40% girls. In an examination 8% of the boys and 12% of the girls got an 'A' grade. If a randomly selected student had an 'A' grade, what is the probability that the student is male?

1. 0.7
2. 0.6
3. 0.4
4. 0.5

Q15. [June 2024] . 3.5 marks

Mathematical Physics > Probability

CSIR NET	2024 June	3.5M
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Probability density function of a variable x is given by $P(x) = \frac{1}{2} [\delta(x - a) + \delta(x + a)]$. The variance of x is

1. a^2
2. 0
3. $2a^2$
4. $\frac{a^2}{2}$

Q16. [Dec 2025] . 3.5 marks

Mathematical Physics > Probability

CSIR NET	2025 Dec	3.5M	MMP
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Let $p(x)$ be the probability density function for a positive real variable x , and

$$g(\alpha) = \int_0^{\infty} p(x)e^{-\alpha x} dx.$$

If $g'(\alpha)$ and $g''(\alpha)$ are respectively first and second derivatives of $g(\alpha)$ with respect to α , which of the following gives the variance of x ?

1. $g''(0) - [g'(0)]^2$
2. $g''(0) + [g'(0)]^2$
3. $[g''(0) - g'(0)]^2$
4. $\frac{g''(0)}{g'(0)g(0)}$

Q17. [Dec 2025] . 5.0 marks

Mathematical Physics > Probability

CSIR NET	2025 Dec	5M	MMP
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In a heap of 20 biased coins, 17 have a 60% probability of showing heads while the other three special coins have a 90% probability of doing so. A coin is selected at random and tossed. If the result is a head, the probability that it was one of the three special coins is best approximated by

1. 0.18
2. 0.14
3. 0.21
4. 0.26

Q18. [June 2025] . 5.0 marks

Mathematical Physics > Probability

CSIR NET	2025 June	5M	MMP
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From a straight-line segment of unit length, three points are chosen at random, one after another. The probability that they are in increasing order is

1. $\frac{1}{3}$
2. $\frac{1}{8}$
3. $\frac{1}{9}$
4. $\frac{1}{6}$

Answer Key

18 questions . Subject and topic for quick revision

Q. No	Subject	Topic	Answer
Q1	Mathematical Physics	Probability	3
Q2	Mathematical Physics	Probability	3
Q3	Mathematical Physics	Probability	4
Q4	Mathematical Physics	Probability	1
Q5	Mathematical Physics	Probability	1
Q6	Mathematical Physics	Probability	2
Q7	Mathematical Physics	Probability	4
Q8	Mathematical Physics	Probability	4
Q9	Mathematical Physics	Probability	4
Q10	Mathematical Physics	Probability	2
Q11	Mathematical Physics	Probability	2
Q12	Mathematical Physics	Probability	4
Q13	Mathematical Physics	Probability	1
Q14	Mathematical Physics	Probability	4
Q15	Mathematical Physics	Probability	1
Q16	Mathematical Physics	Probability	1
Q17	Mathematical Physics	Probability	3
Q18	Mathematical Physics	Probability	4

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