



**Resonance<sup>®</sup>**  
Educating for better tomorrow

# JEE (MAIN) 2026

MEMORY BASED QUESTIONS & TEXT SOLUTION

SHIFT-2

**DATE & DAY:** 21<sup>st</sup> January 2026 & Wednesday

**PAPER-1**

**Duration:** 3 Hrs.

**Time:** 09:00 – 12:00 IST

**SUBJECT: MATHEMATICS**

Selections in JEE (Advanced)/  
IIT-JEE Since 2002

**52979**

Classroom: 35901 | Distance: 17078

Selections in JEE (Main)/  
AIEEE Since 2009

**262693**

Classroom: 194471 | Distance: 68222

Selections in NEET (UG)/  
AIPMT/AIIMS Since 2012

**22733**

Classroom: 15409 | Distance: 7324

**Admission Open for 2026-27**

**Target:** JEE (Advanced) | JEE (Main) | NEET (UG) | PCCP (Class V to X)

**100% Scholarship** on the basis of Class 10<sup>th</sup>, 12<sup>th</sup>  
& JEE (Main) 2026 %ile / AIR

☎ 0744-2777777 | 📞 73400 10345 | Follow Us: @ResonanceEdu | @Resonance\_Edu

**REGISTERED & CORPORATE OFFICE (CIN: U80302RJ2007PLC024029):**

**CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Rajasthan) - 324005**

☎ 0744-2777777 | 📞 73400 10345 | 📧 contact@resonance.ac.in | 🌐 www.resonance.ac.in | Follow Us: @ResonanceEdu | @Resonance\_Edu

This Solution was download from Resonance JEE (Main) 2026 Solution Portal

## MATHEMATICS

1. If three vectors are given as shown.

If angle between vector  $\vec{p}$  and  $\vec{q}$  is  $\theta$  where  $\cos \theta = \frac{1}{\sqrt{3}}$  and  $|\vec{p}| = 2\sqrt{3}$ ,  $|\vec{q}| = 2$ . Then the value of  $|\vec{p} \times (\vec{q} - 3\vec{r})|^2 - 3|\vec{r}|^2$  is :

- (1) 104 (2) 102 (3) 108 (4) 106

Ans. (1)

2. Let one end of a focal chord of the parabola  $y^2 = 16x$  be  $(16, 16)$ . If  $P(\alpha, \beta)$  divides this focal chord internally in the ratio 5: 2; then the minimum value of  $\alpha + \beta$  is equal to:

- (1) 7 (2) 22 (3) 5 (4) 16

Ans. (2)

3. The largest  $n \in \mathbb{N}$ , for which  $7^n$  divides  $101!$  is

- (1) 16 (2) 18 (3) 19 (4) 15

Ans. (1)

4. Let  $f(x) = x^3 + x^2 f'(1) + 2x f''(2) + f'''(3)$ ,  $x \in \mathbb{R}$ . Then the value of  $f'(5)$  is

- (1)  $\frac{117}{5}$  (2)  $\frac{62}{5}$  (3)  $\frac{657}{5}$  (4)  $\frac{2}{5}$

Ans. (1)

5. If the line  $\alpha x + 2y - 4 = 0$  is the tangent to the ellipse  $3x^2 + 4y^2 = 1$  then  $\alpha$

- (1)  $3\sqrt{5}$  (2)  $2\sqrt{5}$  (3)  $5\sqrt{5}$  (4)  $8\sqrt{5}$

Ans. (1)

6. Let  $O$  be the vertex of the parabola  $y^2 = 16x$ .

The locus of centroid of  $\triangle OPA$  when  $P$  lies on parabola, and  $A$  lies on  $x$ -axis and  $\angle OPA = 90^\circ$

- (1)  $y^2 = 8(3x - 16)$  (2)  $9y^2 = 8(3x - 16)$   
(3)  $y^2 = 8(3x + 16)$  (4)  $9y^2 = 8(3x + 16)$

Ans. (2)

7. Let the line  $L$  pass through the point  $(-3, 5, 2)$  and make equal angle with the positive coordinate axes.

If the distance of  $L$  from the point  $(-2, r, 1)$  is  $\sqrt{\frac{14}{3}}$ , then the sum of all possible values of  $r$  is

- (1) 16 (2) 10 (3) 12 (4) 6

Ans. (2)

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | facebook.com/ResonanceEdu | twitter.com/ResonanceEdu | www.youtube.com/resowatch | blog.resonance.ac.in

8. If the product  $\left(\frac{1}{15C_0} + \frac{1}{15C_1}\right)\left(\frac{1}{15C_1} + \frac{1}{15C_2}\right) \dots \left(\frac{1}{15C_{12}} + \frac{1}{15C_{13}}\right) = \frac{\alpha^{13}}{14C_0 \cdot 14C_1 \cdot 14C_2 \dots 14C_{12}}$ , then  $30\alpha$  is equal to
- (1) 16 (2) 32 (3) 15 (4) 28

Ans. (2)

9. Let  $Z$  be the complex number satisfying  $|z - 5| \leq 3$  and having maximum positive argument, then  $34 \left| \frac{5z-12}{5z+16} \right|^2$  is equal to
- (1) 16 (2) 26 (3) 12 (4) 20

Ans. (4)

10. Let  $a_1, \frac{a_2}{2}, \frac{a_3}{2^2}, \dots, \frac{a_{10}}{2^9}$  be a G.P of common ratio  $\frac{1}{\sqrt{2}}$ . If  $a_1 + a_2 + \dots + a_{10} = 62$ , then  $a_1$  is equal to
- (1)  $\sqrt{2} - 1$  (2)  $2(2 - \sqrt{2})$  (3)  $2(\sqrt{2} - 1)$  (4)  $2 - \sqrt{2}$

Ans. (3)

11. Lines  $L_1$  &  $L_2$  are  $\frac{x-1}{2} = \frac{y}{1} = \frac{z+1}{2}$  &  $\frac{x}{2} = \frac{y}{-1} = \frac{z+1}{1}$  respectively, if a line  $L$  with direction ratios (1,1,1) intersects  $L_1$  &  $L_2$  at A & B respectively, then Find  $(AB)^2$  :
- (1) 27 (2) 26 (3) 18 (4) 9

Ans. (1)

12. If  $x \in \left[-\frac{\sqrt{3}}{2}, \frac{1}{\sqrt{2}}\right]$ , then maximum value of the expression  $(\sin^{-1} x)^2 + (\cos^{-1} x)^2$  is  $\frac{n\pi^2}{n+7}$  (where  $n \in \mathbb{N}$ ) then  $n$  is equal to:

Ans. (29)

13. If probability distribution is given by,

$x$	0	1	2	3
$p(x)$	$\frac{8a-1}{30}$	$\frac{4a-1}{30}$	$\frac{2a+1}{30}$	$b$

If it is given that  $\sigma^2 + \mu^2 = 2$ , where  $\sigma$  is standard deviation and  $\mu$  is mean of distribution then  $\frac{a}{b}$  is

- (1)  $\frac{22}{71}$  (2)  $\frac{110}{71}$  (3)  $\frac{220}{71}$  (4)  $\frac{1110}{71}$

Ans. (4)

14.  $\int_0^1 \cot^{-1}(x^2 + x + 1) dx$  is equal to
- (1)  $\int_0^1 \tan^{-1}(x+1) dx - \int_0^1 \tan^{-1} x dx$  (2)  $\int_0^1 (\tan^{-1}(x+1) + \tan^{-1} x) dx$
- (3)  $\int_0^1 4 \tan^{-1} x dx$  (4)  $3 \int_0^1 \tan^{-1}(x+1) dx$

Ans. (1)

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | facebook.com/ResonanceEdu | twitter.com/ResonanceEdu | www.youtube.com/resowatch | blog.resonance.ac.in

15. The maximum value of  $(\sin^{-1} x)^2 + (\cos^{-1} x)^2$  in  $x \in \left[-\frac{\sqrt{3}}{2}, \frac{1}{\sqrt{2}}\right]$  is  $\frac{a\pi^2}{b}$ , then  $a + b$  is

Ans. (65)

16. Let  $\alpha$  and  $\beta$  be the roots of the equation  $x^2 + 2ax + (3a + 10) = 0$  such that  $\alpha < 1 < \beta$ . Then the set of all possible values of  $a$  is

- (1)  $\left(-\infty, -\frac{11}{5}\right) \cup (5, \infty)$  (2)  $(-\infty, -3)$  (3)  $(-\infty, -8) \cup (5, \infty)$  (4)  $\left(-\infty, -\frac{11}{5}\right)$

Ans. (4)

17. For Matrices  $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$  and  $B = \begin{bmatrix} -29 & 49 \\ -13 & 18 \end{bmatrix}$ , if  $(A^{15} + B) \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ , then among the following which one is correct

- (1)  $x = 11, y = 2$  (2)  $x = 5, y = 7$   
(3)  $x = 18, y = 11$  (4)  $x = 16, y = 3$

Ans. (1)

18. If the area of the region  $\{(x, y) : 1 - 2x \leq y \leq 4 - x^2, x \geq 0, y \geq 0\}$  is  $\frac{\alpha}{\beta}$ ,  $\alpha, \beta \in \mathbb{N}$ ,  $\gcd(\alpha, \beta) = 1$ , then the value of  $(\alpha + \beta)$  is

- (1) 67 (2) 73 (3) 91 (4) 85

Ans. (2)

19. Let  $A = \{2, 3, 4, 5, 9\}$  and relation  $R = \{(x, y) : 2x \leq 3y, x, y \in A\}$ . If  $m$  is the number of elements in  $R$  and  $n$  is the number of elements to be added in  $R$  to make it symmetric, then  $m + n$  is equal to

- (1) 20 (2) 28 (3) 35 (4) 25

Ans. (4)

20. Let  $f(x) = \lim_{n \rightarrow \infty} \left( \frac{1}{n^3} \sum_{k=1}^n \left[ \frac{k^2}{3x} \right] \right)$ , where  $[.]$  denotes the greatest integer function, then  $12 \sum_{j=1}^{\infty} f(j)$  is equal to

- (1) 4 (2) 1 (3) 2 (4) 3

Ans. (3)

21. If  $(\sec x) \frac{dy}{dx} - 2y = 2 + 3 \sin x$  and  $y(0) = -\frac{7}{4}$  then  $y\left(\frac{\pi}{6}\right)$  is

- (1)  $\frac{3}{4}$  (2)  $\frac{4}{3}$  (3)  $\frac{5}{2}$  (4)  $-\frac{5}{2}$

Ans. (4)

## Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | facebook.com/ResonanceEdu | twitter.com/ResonanceEdu | www.youtube.com/resowatch | blog.resonance.ac.in