



JEE (MAIN) 2025

MEMORY BASED QUESTIONS & TEXT SOLUTION

SHIFT-2

DATE & DAY: 02nd April 2025 & Wednesday

PAPER-1

Duration: 3 Hrs.

Time: 03:00 PM – 06:00 PM

SUBJECT: MATHEMATICS

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

52395

Selections in JEE (Main)/
AIEEE Since 2009

257576

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

22494

Admission Open for 2025-26

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

100% Scholarship on the basis of Class 10th & 12th
& JEE (Main) 2025 %ile/ AIR

 **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 solutions was download from Resonance JEE (Main) 2025 Solution Portal

TARGET: JEE (Adv.) 2024



**AIR
31**

JEE (Adv.) 2024

ISHAAN GUPTA

SCHOLARSHIP UPTO 100%

on the basis of Class 10th & 12th &
JEE (Main) 2025 %ile/ AIR

VISHESH COURSE

For 12th Passed Students

Course Features:

- ▶ Course Duration: **42 Weeks**
- ▶ Total No. of Lectures: **630** (P: 210 | C: 210 | M: 210)
- ▶ Duration of One Lecture: **1.5 Hrs.** (90 Minutes)
- ▶ Classroom Teaching Hours.: **945 Hrs.**
- ▶ Testing Duration: **51 Hrs.**
- ▶ Total Academic Hours.: **996 Hrs.**

*Tentative



CLASS STARTS
7th April 2025

TARGET: JEE (Main) 2026

ABHYAAS COURSE

For 12th Passed Students

Course Features:

- ▶ Course Duration: **39 Weeks**
- ▶ Total No. of Lectures: **577** (P: 192 | C: 193 | M: 192)
- ▶ Duration of One Lecture: **1.5 Hrs.** (90 Minutes)
- ▶ Classroom Teaching Hours.: **865 Hrs.**
- ▶ Testing Duration: **36 Hrs.**
- ▶ Total Academic Hours.: **901 Hrs.**

*Tentative

**AIR
102**

JEE (MAIN) 2024

RITAM BANERJEE



SCHOLARSHIP UPTO 100%

on the basis of Class 10th & 12th &
JEE (Main) 2025 %ile/ AIR



CLASS STARTS
7th April 2025

PART : MATHEMATICS

1. The value of $\int_{-2}^2 \frac{9x^2}{1+5^x} dx$ is

(1) 12

(2) 24

(3) 30

(4) 15

Ans. (2)

Sol. $I = \int_{-2}^2 \frac{9x^2}{1+5^x} dx \dots\dots\dots(i)$

$$= \int_{-2}^2 \frac{9(0-x)^2}{1+5^{0-x}} dx$$

$$= \int_{-2}^2 \frac{9x^2}{1+5^{-x}} dx$$

$$= 2 \int_0^2 \frac{9x^2}{1+5^x} dx$$

$$I = \int_{-2}^{\infty} \frac{1}{1+5^x} dx \dots\dots (ii)$$

(i) + (ii)

$$2I = \int_{-2}^2 \frac{9x^2(1+5^x)}{1+5^x} dx$$

$$2I = 2 \int_0^2 9x^2 dx$$

$$I = \frac{9}{3} (8) = 24$$

$$I = 24$$

2. The eccentricity of ellipse in which length of minor axis is equal to one fourth of the distance between foci, is

(1) $\frac{4}{\sqrt{17}}$

(2) $\frac{2}{\sqrt{17}}$

(3) $\frac{7}{\sqrt{17}}$

(4) $\frac{8}{\sqrt{17}}$

Ans. (1)

Sol. $2b = \frac{1}{4} \times 2ae$ & $b^2 = a^2(1 - e^2)$

$$\Rightarrow 4b = ae$$

$$\Rightarrow 16b^2 = a^2e^2$$

$$\Rightarrow 16a^2(1 - e^2) = a^2e^2$$

$$\Rightarrow 16 = 17e^2$$

$$\Rightarrow e = \frac{4}{\sqrt{17}}$$

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

This solution was download from Resonance JEE(Main) 2025 Solution portal

PAGE #1

3. Total number of terms in an A.P. are even, sum of odd terms is 24 and sum of even terms is 30. Last term exceeds the first terms by $\frac{21}{2}$. Then total number of terms is _____.

Ans. (8)

Sol. Let $2n$ be number of terms

$$T_1 + T_3 + \dots + T_{2n-1} = 24 \quad \dots (1)$$

$$T_2 + T_4 + \dots + T_{2n} = 30 \quad \dots (2)$$

$$(2) - (1) \Rightarrow nd = 6$$

$$\& \quad T_{2n} - T_1 = \frac{21}{2}$$

$$\Rightarrow T_1 + (2n - 1)d - T_1 = \frac{21}{2}$$

$$\Rightarrow 2nd - d = \frac{21}{2} \Rightarrow 12 - d = \frac{21}{2}$$

$$\Rightarrow d = 12 - \frac{21}{2} = \frac{3}{2}$$

$$nd = 6 \Rightarrow n \times \frac{3}{2} = 6 \Rightarrow n = 4$$

4. If the domain of the function

$$f(x) = \frac{1}{\sqrt{3x+10-x^2}} + \frac{1}{\sqrt{x+1}}$$

is (a, b) then $(1+a)^2 + b^2$ is equal to _____.

Ans. (26)

Sol. $3x + 10 - x^2 > 0$

& $x + |x| > 0$

$\Rightarrow x^2 - 3x - 10 < 0$

& $\begin{cases} x \geq 0 \\ \text{or} \\ x < 0 \end{cases}$

$\Rightarrow (x-5)(x+2) < 0$

$\Rightarrow 2x > 0$

$\Rightarrow x - x > 0$

$\Rightarrow -2 < x < 5$

$\Rightarrow x > 0$

$\Rightarrow 0 > 0, x \in \phi$

So $x \in (0, 5)$

$\Rightarrow a = 0, b = 5$

$\Rightarrow (1+a)^2 + b^2 = 1 + 25 = 26$

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

This solution was download from Resonance JEE(Main) 2025 Solution portal

PAGE #2



| JEE(Main) 2025 | DATE : 02-04-2025 (SHIFT-2) | PAPER-1 | MEMORY BASED | MATHEMATICS

5. If $\frac{dy}{dx} + 2y\sec^2 x = 2\sec^2 x + 3\tan x \cdot \sec^2 x$ and $f(0) = \frac{5}{4}$. Then the value of $12 \left(y\left(\frac{\pi}{4}\right) - \frac{1}{e^2} \right)$ is equal to ____.

Ans. (21)

Sol. $\frac{dy}{dx} + py = Q \Rightarrow y \cdot e^{\int P dx} = \int Q \cdot e^{\int P dx} dx$

$y \cdot e^{\int 2\sec^2 x dx} = \int (2\sec^2 x + 3\tan x \cdot \sec^2 x) \cdot e^{2\tan x} dx$

$y \cdot e^{2\tan x} = \int (2 + 3\tan x) \cdot e^{2\tan x} \cdot \sec^2 x dx$

$= \int \left(2 + 3 \cdot \frac{t}{2} \right) \cdot e^t \cdot \frac{dt}{2}$

$2\tan x = t$

$2\sec^2 x dx = dt$

$= \frac{1}{4} \int (4 + 3t) \cdot e^t dt$

$= \frac{1}{4} \left\{ (4 + 3t) \cdot e^t - \int 3 \cdot e^t dt \right\}$

$= \frac{1}{4} (4 + 3t) \cdot e^t - \frac{3}{4} \cdot e^t$

$= \frac{1}{4} (4 + 6\tan x) \cdot e^{2\tan x} - \frac{3}{4} \cdot e^{2\tan x}$

$= \frac{1}{4} (4 + 6\tan x - 3) \cdot e^{2\tan x} + C$

$\Rightarrow y \cdot e^{2\tan x} = \frac{(1 + 6\tan x) \cdot e^{2\tan x}}{4} + C$

$\frac{5}{4} = \frac{1}{4} + C \Rightarrow C = 1$

So $y\left(\frac{\pi}{4}\right) \cdot e^2 = \frac{7}{4} \cdot e^2 + 1$

$y\left(\frac{\pi}{4}\right) = \frac{7}{4} + \frac{1}{e^2}$

$12 \left(y\left(\frac{\pi}{4}\right) - \frac{1}{e^2} \right) = 21$

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

This solution was download from Resonance JEE(Main) 2025 Solution portal

PAGE #3

Resonance® | JEE(Main) 2025 | DATE : 02-04-2025 (SHIFT-2) | PAPER-1 | MEMORY BASED | MATHEMATICS

6. Let $10 \int_1^x f(t) dt = 5xf(x) + x^5 + 9$, where $x \geq 1$ & $f(x) \geq 2$, then value of $f(3)$ is equal to
- (1) 32 (2) -32 (3) 64 (4) -64

Ans. (2)

Sol. $10f(x) = 5f(x) + 5x f'(x) + 5x^4$

$$f(x) = x f'(x) + x^4$$

$$f(x) - \frac{1}{x} f(x) = -x^3$$

$$\text{I.F. } e^{-\int \frac{1}{x} dx} = e^{-\ln x} = \frac{1}{x}$$

Sol. $y \cdot \frac{1}{x} = -\int \frac{1}{x} \cdot x^3 dx + C$

$$\frac{y}{x} = -\frac{x^3}{3} + C$$

$$f(1) = (-2) \quad -\frac{2}{1} = -\frac{1}{3} + C \quad C = -\frac{5}{3}$$

$$f(x) = y = -\frac{x^4}{3} - \frac{5}{3}x$$

$$f(3) = -3^3 - 5$$

$$f(3) = -27 - 5 = -32$$

7. There are '3' bags with following balls.

	Red	Blue	Green
Bag - I	4	3	3
Bag - II	2	3	5
Bag - III	6	2	2

Given that $P(I/R) = p$ and $P(III/G) = q$

Then $\frac{1}{p} + \frac{1}{q}$ is _____.

- (1) 8 (2) 6 (3) 4 (4) 10

Ans. (1)

Sol. $P(I/R) = \frac{\frac{1}{3} \times \frac{4}{10}}{\frac{1}{3} \times \frac{4}{10} + \frac{1}{3} \times \frac{2}{10} + \frac{1}{3} \times \frac{6}{10}} = \frac{4}{12} = \frac{1}{3} = p$

$$P(III/G) = \frac{\frac{1}{3} \times \frac{2}{10}}{\frac{1}{3} \times \frac{3}{10} + \frac{1}{3} \times \frac{5}{10} + \frac{1}{3} \times \frac{2}{10}} = \frac{2}{10} = \frac{1}{5} = q$$

So, $\frac{1}{p} + \frac{1}{q} = 3 + 5 = 8$

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/resonance | blog.resonance.ac.in

This solution was download from Resonance JEE(Main) 2025 Solution portal

PAGE #4



JEE(Main) 2025 | DATE : 02-04-2025 (SHIFT-2) | PAPER-1 | MEMORY BASED | MATHEMATICS

8. The number of ways to arrange the letters A, B, C, D, E in given figure if every row has atleast one letter is –

			3	2	2	1	1
			1	2	1	3	2
			1	1	2	1	2

Ans. (5760)

Sol. R₁ R₂ R₃

3 1 1

2 2 1

2 1 2

1 3 1

1 2 2

$({}^3C_3 \times {}^2C_1 \times {}^2C_1 + {}^3C_2 \cdot {}^2C_2 + {}^3C_2 \cdot {}^2C_1 + {}^3C_1 \cdot {}^2C_2 + {}^3C_1 \cdot {}^2C_3 + {}^3C_3 \cdot {}^2C_1 + {}^3C_1 \cdot {}^2C_2 + {}^2C_2) 5!$

$(6 + 18 + 9 + 6 + 9) 5!$

$= 48 \times 120$

$= 5760$ Ans.

9. If mean and variance of eight observations a,b,8,12,10,6,4,15 is 9 and 9.25 respectively. Then a + b + ab is equal to

(1) 76

(2) 83

(3) 79

(4) 93

Ans. (4)

Sol. $\bar{x} = \frac{a+b+55}{8} = 9 \Rightarrow a+b = 72 - 55$

$a+b = 17$ (i)

$\sigma^2 = \frac{\sum x_i^2}{8} - \bar{x}^2 = \frac{a^2 + b^2 + 64 + 144 + 100 + 36 + 16 + 225}{8} - 9^2$

$\Rightarrow \frac{a^2 + b^2 + 585}{8} - 81 = 9.25$

$a^2 + b^2 - 63 = 74 \Rightarrow a^2 + b^2 = 137$ (ii)

$(a+b)^2 = 289 \Rightarrow 137 + 2ab = 289$

$\Rightarrow 2ab = 152$

$\Rightarrow ab = 76$

So, $a+b+ab = 17+76=93$

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/resonance | blog.resonance.ac.in

This solution was download from Resonance JEE(Main) 2025 Solution portal

PAGE #5

10. The value of $4 \int_0^1 \frac{1}{\sqrt{1+x^2} + \sqrt{3+x^2}} dx - 3\ln\sqrt{3}$ is

- (1) $2 + \sqrt{2} - \ln(1 + \sqrt{2})$ (2) $2 - \sqrt{2} - \ln(1 + \sqrt{2})$
 (3) $2 - \sqrt{2} + \ln(1 + \sqrt{2})$ (4) $2 + \sqrt{2} + \ln(1 + \sqrt{2})$

Ans. (2)

Sol. Let $A = 4 \int_0^1 \frac{1}{\sqrt{3+x^2} + \sqrt{1+x^2}} dx$

$$A = 2 \int_0^1 (\sqrt{3+x^2} - \sqrt{1+x^2}) dx$$

$$A = 2 \left[\frac{1}{2} x \sqrt{3+x^2} + \frac{3}{2} \ln(x + \sqrt{3+x^2}) - \frac{1}{2} x \sqrt{1+x^2} - \frac{1}{2} \ln(x + \sqrt{1+x^2}) \right]_0^1$$

$$A = 2 + 3 \ln(3) - \sqrt{2} - \ln(1 + \sqrt{2}) - [3\ln\sqrt{3}]$$

$$A = 2 - \sqrt{2} - \ln(1 + \sqrt{2}) + 3\ln\sqrt{3}$$

$$\begin{aligned} A - 3\ln\sqrt{3} &= 2 - \sqrt{2} - \ln(1 + \sqrt{2}) + 3\ln\sqrt{3} - 3\ln\sqrt{3} \\ &= 2 - \sqrt{2} - \ln(1 + \sqrt{2}) \end{aligned}$$

11. If $\lim_{x \rightarrow 0} \frac{\cos(2x) - a \cos(4x) + b}{x^4}$ exists then the value of (a + b) is.

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

Ans. (3)

Sol. Let $L = \lim_{x \rightarrow 0} \frac{\cos 2x - a \cos 4x + b}{x^4}$

$$= \lim_{x \rightarrow 0} \frac{\left(1 - \frac{(2x)^2}{2!} + \frac{(2x)^4}{4!} - \dots\right) - a \left(1 - \frac{(4x)^2}{2!} + \frac{(4x)^4}{4!} - \dots\right) + b}{x^4}$$

$$= \lim_{x \rightarrow 0} \frac{(1 - a + b) + x^2(-2 + 8a) + x^4\left(\frac{2}{3} - \frac{32a}{3}\right) + \dots}{x^4}$$

For L to exist

$$1 - a + b = 0 \quad \text{and} \quad -2 + 8a = 0$$

$$a - b = 1 \quad \text{and} \quad a = \frac{1}{4}$$

$$b = a - 1 = \frac{1}{4} - 1 = -\frac{3}{4}$$

$$a + b = \frac{1}{4} - \frac{3}{4} = -\frac{1}{2}$$

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/resonance | blog.resonance.ac.in

This solution was download from Resonance JEE(Main) 2025 Solution portal

PAGE #6

12. Let $\sum_{r=0}^{10} \left(\frac{10^{r+1} - 1}{10^r} \right) \cdot {}^{11}C_{r+1} = \frac{n^{11} - (11)^{11}}{10^{10}}$, the value of n is.

Ans. (20)

Sol. $10 \sum_{r=0}^{10} {}^{11}C_{r+1} - 10 \sum_{r=0}^{10} {}^{11}C_{r+1} \left(\frac{1}{10} \right)^{r+1}$

$$=10\left[2^{11}-1\right]-10\left[\left(1+\frac{1}{10}\right)^{11}-{}^{11}C_0\left(\frac{1}{10}\right)^0\right]$$

$$=10\left[2^{11}-1-\left(\frac{11}{10}\right)^{11}+1\right]$$

$$=\frac{20^{11}-11^{11}}{10^{10}}$$

So $n=20$ **Ans.**

13. Consider the series $\frac{4(1)}{1+4(1)^4} + \frac{4(2)}{1+4(2)^4} + \frac{4(3)}{1+4(3)^4} + \dots$. Find the sum of its first 10 terms.

(1) $\frac{220}{221}$

(2) $\frac{221}{220}$

(3) 1

(4) $\frac{219}{220}$

Ans. (1)

Sol. $\therefore T_n = \frac{4n}{1+4n^4} = \frac{4n}{(2n^2+1)-4n^2}$

$$= \frac{4n}{(2n^2+1+2n)-(2n^2+1-2n)}$$

$$= \frac{1}{(2n^2-2n+1)} - \frac{1}{(2n^2+2n+1)}$$

$$\therefore = \sum_{n=1}^{10} T_n = \left(\frac{1}{5} - \frac{1}{5}\right) + \left(\frac{1}{5} - \frac{1}{5}\right)$$

$$\frac{1}{13} - \frac{1}{25}$$

$$\frac{1}{181} - \frac{1}{221}$$

$$\therefore = \sum_{n=1}^{10} T_n = 1 - \frac{1}{221} = \frac{220}{221}$$

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

This solution was download from Resonance JEE(Main) 2025 Solution portal

PAGE #7

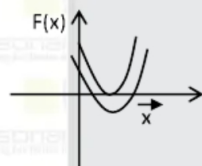
14. If the roots of the equation $(1-a)x^2 + 2(a-3)x + 9 = 0$ are positive, then $a \in (-\infty, -\lambda] \cup [\mu, \delta)$. The value of $\lambda^2 + \mu^2 + \delta^2$ is

Ans. (10)

Sol. $(1-a)x^2 + 2(a-3)x + 9 = 0$

$$x^2 + \frac{2(a-3)}{(1-a)}x + \frac{9}{1-a} = 0$$

$$\text{Let } f(x) = x^2 + \frac{2(a-3)}{(1-a)}x + \frac{9}{1-a}$$



For roots to be positive

$$(i) f(0) > 0 \quad (ii) \Delta \geq 0 \quad (iii) -\frac{b}{2a} > 0$$

$$(i) f(0) > 0 \Rightarrow \frac{9}{1-a} > 0 \Rightarrow a < 1$$

$$(ii) \Delta \geq 0 \Rightarrow \frac{4(a-3)^2}{(1-a)^2} - 4 \times 1 \times \frac{9}{(1-a)} \geq 0$$

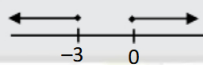
$$4(a-3)^2 - 36(1-a) \geq 0; a \neq 1$$

$$(a-3)^2 - 9(1-a) \geq 0$$

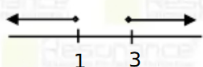
$$a^2 - 6a + 9 - 9 + 9a \geq 0$$

$$a^2 + 3a \geq 0$$

$$a(a+3) \geq 0$$



$$(iii) -\frac{b}{2a} > 0 \Rightarrow \frac{-2\left(\frac{a-3}{1-a}\right)}{2} > 0 \Rightarrow \frac{a-3}{a-1} > 0$$



$$\therefore (i) \cap (ii) \cap (iii)$$

$$\Rightarrow a \in (-\infty, -3] \cup [0, 1)$$

$$\therefore \lambda = 3, \mu = 0 \text{ and } \delta = 1$$

$$\therefore \lambda^2 + \mu^2 + \delta^2 = 9 + 0 + 1 = 10$$

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

This solution was download from Resonance JEE(Main) 2025 Solution portal

PAGE #8



JEE(Main) 2025 | DATE : 02-04-2025 (SHIFT-2) | PAPER-1 | MEMORY BASED | MATHEMATICS

15. 'A' be a matrix such that $A^2(A - I) - 4(A - I) = 0$. If $A^5 = \lambda A^2 + \mu A + \delta I$, then find the value of $(\lambda + \mu + \delta)$

Ans. (1)

Sol. $\therefore A^2(A - I) - 4(A - I) = 0$
 $A^3 - A^2 - 4A + 4I = 0$
 $A^3 = A^2 + 4A - 4I$
 $\Rightarrow A^4 = A^3 + 4A^2 - 4A$
 $\quad = (A^2 + 4A - 4I) + 4A^2 - 4A$
 $A^4 = 5A^2 - 4I$
 $\Rightarrow A^5 = 5A^3 - 4A$
 $\quad = 5(A^2 + 4A - 4I) - 4A$
 $A^5 = 5A^2 + 16A - 20I$
 $\Rightarrow \lambda = 5; \mu = 16; \delta = -20$
 $\therefore \lambda + \mu + \delta = 1$

16. Consider a triangle ABC, where A (4, -2), B(1, 1) and C(9, 3) a parallelogram ADEF is drawn such that D lies on AB, E lies on BC and F lies on AC. The maximum area of parallelogram is

(1) $\frac{7}{2}$

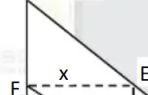
(2) $\frac{15}{2}$

(3) $\frac{3}{2}$

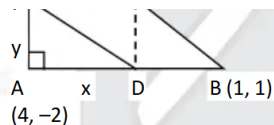
(4) $\frac{17}{2}$

Ans. (2)

C(9, 3)



Sol.



$$\begin{aligned}
 \therefore AB &= \sqrt{9+9} = 3\sqrt{2} = c & BC &= \sqrt{64+4} = 2\sqrt{17} = a & CA &= \sqrt{25+25} = 5\sqrt{2} = b \\
 \Rightarrow a^2 &= b^2 + c^2 \\
 \Rightarrow \triangle ABC &\text{ is right angled} \\
 \therefore \text{area of } \triangle &= xy \quad \dots(i) \\
 \therefore \frac{x}{c} &= \frac{b-y}{b} \Rightarrow x = \frac{c}{b} (b-y) \\
 \therefore A &= xy = \frac{c}{b} y (b-y) \\
 \therefore A &= xy = \frac{c}{b} (by - y^2) \\
 \therefore A &\text{ maximum will be at } y = \frac{b}{2} \\
 \therefore A &\text{ maximum} = \frac{bc}{4} = \frac{15 \times 2}{4} = 7.5
 \end{aligned}$$

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](https://www.facebook.com/ResonanceEdu) | twitter.com/ResonanceEdu | www.youtube.com/resowatch | blog.resonance.ac.in

This solution was download from Resonance JEE(Main) 2025 Solution portal

PAGE #9