MHT CET 2025 PCM 26 April Shift 1 Question Paper

Time Allowed :3 Hour	Maximum Marks :200	Total Questions :150

1. Evaluate the integral:

$$\int \frac{\sqrt{\tan x}}{\sin x \cos x}\, dx$$

(A) $\frac{2}{\cos^2 x}$

(B) $\frac{2}{\sin^2 x}$

(C) $\frac{2}{\cos x}$

(D) $\frac{2}{\sin x}$

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2. Population of Town A and B was 20,000 in 1985. In 1989, the population of Town A was 25,000, and Town B had 28,000. What will be the difference in population between the two towns in 1993?

(A) 5950

(B) 6950

(C) 4500

(D) 0

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3. A die was thrown n times until the lowest number on the die appeared. If the mean is $\frac{n}{g}$, then what is the value of n?

(A) 2

(B) 3

(C) 4

(D) 5

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4. There are 6 boys and 4 girls. Arrange their seating arrangement on a round table such that 2 boys and 1 girl can't sit together.

(A) $6! \times 4!$

(B) $6! \times 3! \times 4!$

(C) $5! \times 4!$

(D) $5! \times 3! \times 4!$

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5. Choose a randomly selected leap year, in which 52 Saturdays and 53 Sundays are to be there. Given the following probability distribution:

x	1	2	3	4
$p(x)$	0.1	0.2	0.3	0.4

Find the mean and standard deviation.

(A) Mean = 2.7, Standard Deviation = 1.5

(B) Mean = 2.5, Standard Deviation = 1.2

(C) Mean = 2.4, Standard Deviation = 1.4

(D) Mean = 3.0, Standard Deviation = 1.6

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6. If $\tan^{-1}(\sqrt{\cos\alpha}) - \cot^{-1}(\cos\alpha) = x$**, then what is** $\sin\alpha$**?**

(A) $\tan\left(\frac{x}{2}\right)$

(B) $\cot\left(\frac{x}{2}\right)$

(C) $\cot^2\left(\frac{x}{2}\right)$

(D) $\tan^2\left(\frac{x}{2}\right)$

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7. If $\tan(\pi\cos x) = \cot(\pi\sin x)$**, then what is** $\sin\left(\frac{\pi}{2} + x\right)$**?**

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

(B) $\frac{1}{\sqrt{2}}$

(C) $-\frac{1}{2}$

(D) $-\frac{1}{\sqrt{2}}$

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8. Evaluate the integral:

$$\int \frac{1}{\sin^2 2x \cdot \cos^2 2x}\, dx$$

(A) $\frac{1}{2}\tan 2x$

(B) $\frac{1}{2}\cot 2x$

(C) $\frac{1}{4}\cot 2x$

(D) $\frac{1}{4}\tan 2x$

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9. Given the equation:

$$81\sin^2 x + 81\cos^2 x = 30$$

Find the value of x.

(A) $x = \frac{\pi}{4}$

(B) $x = \frac{\pi}{6}$

(C) $x = \frac{\pi}{3}$

(D) $x = \frac{\pi}{2}$

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10. The angle between the lines whose direction cosines satisfy the equations:

$$l + m + n = 0 \quad \textbf{and} \quad m^2 + n^2 - l^2 = 0$$

Find the angle between the two lines.

(A) 30°

(B) 45°

(C) 60°

(D) 90°

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11. Let $\mathbf{a}$**,** $\mathbf{b}$**, and** $\mathbf{c}$ **be vectors of magnitude 2, 3, and 4 respectively. If:** - $\mathbf{a}$ is perpendicular to $(\mathbf{b} + \mathbf{c})$, - $\mathbf{b}$ is perpendicular to $(\mathbf{c} + \mathbf{a})$, - $\mathbf{c}$ is perpendicular to $(\mathbf{a} + \mathbf{b})$, **then the magnitude of** $\mathbf{a} + \mathbf{b} + \mathbf{c}$ **is equal to:**

(A) 29

(B) $\sqrt{29}$

(C) 26

(D) $\sqrt{26}$

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12. A boy tries to message his friend. Each time, the chance the message is delivered is $\frac{1}{6}$, and the chance it fails is $\frac{5}{6}$. He sends 6 messages. Find the probability that exactly 5 messages are delivered.

(A) $\frac{1}{6}$

(B) $\frac{5}{6}$

(C) $\binom{6}{5}\left(\frac{1}{6}\right)^5\left(\frac{5}{6}\right)$

(D) $\frac{5}{36}$

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13. Given that $\cot\left(\frac{A+B}{2}\right)\cdot\tan\left(\frac{A-B}{2}\right)=$, and the equation $\frac{x}{2}+\frac{y}{3}+\frac{2}{6}-1=0$, find the area of $\Delta ABC=2$.

(A) 2

(B) 3

(C) 4

(D) 5

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14. Evaluate the following integrals:

$$\int \frac{(x^4+1)}{x(2x+1)^2}\,dx$$

and

$$\int \frac{1}{x^4+5x^2+6}\,dx$$

(A) $\frac{1}{(2x+1)}$

(B) $\frac{1}{(x^4+5x^2+6)}$

(C) $\frac{1}{2}\left(\ln\left|\frac{x^2+3}{x+2}\right|\right)$

(D) $\frac{1}{3}\left(\ln|x^2+5x+6|\right)$

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15. Given that:

$$\cot\left(\frac{A+B}{2}\right)\cdot\tan\left(\frac{A-B}{2}\right)$$

and the equation involving coordinates:

$$\frac{x}{2} + \frac{y}{3} + \frac{2}{6} - 1 = 0$$

Find the area of $\Delta ABC = 2$.

(A) 2

(B) 3

(C) 4

(D) 5
