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MHT CET 2025 PCM 25 April Shift 2 Question Paper

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

1. Principal Solution

(1) $(5 + 3\sin\theta)$

(2) $(2\cos\theta + 1)$

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2. Curves Represented

$x = 3(\cos t + \sin t)$

$y = (\cos t - \sin t)$

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3. Principal Solution

$(5\sin\theta)(2\cos\theta + 1) = 0$

(1) $\frac{2\pi}{3}, \frac{4\pi}{3}$

(2) $\frac{2\pi}{3}, \frac{1}{3}, \frac{2\pi}{3}$

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4. Find the solution

$$\frac{d^2y}{dm^2} - k^3\frac{dy}{dm} = y\cos m, \quad y(0) = 1$$

(1) $y^3 = 3y^3\sin m$

(2) $y^3 = 3x^2\sin m$

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5. Series Expansion

$$n^6 + \frac{1}{2}n^4 + \frac{1}{3}n^2 + \cdots + \frac{1}{n}C_n + 1 \quad n \to \infty$$

(1) 9

(2) 8

(3) 10

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6. Binomial Expansion Series

$$\left(\frac{(1+x)}{(n+1)}\right)' = n_0 x + n_1 \frac{x^2}{2} + n_2 \frac{x^3}{3} + \cdots + n_n \frac{x^n}{n+1}$$

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7. If $y = \frac{b}{a}$, then $\frac{dy}{dx}$ is: (1) $-\frac{b^4}{a}$

(2) $\frac{b^5}{a}$

(3) $-\frac{b^5}{a^2y^3}$

(4) $\frac{b^5}{a^2}$

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8. The eccentricity of the curve represented by

$x = 3(\cos t + \sin t)$, $y = 4(\cos t - \sin t)$ **is:** (1) $\frac{\sqrt{7}}{4}$

(2) $\frac{1}{16}$

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

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

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9. The integral

$$\int e^x \left(\frac{x+5}{(x+6)^2}\right) dx$$

is: (1) $\frac{e^x}{x+6}$

(2) $-\frac{e^x}{x+6}$

(3) $\frac{e^x}{(x+6)}$

(4) $-\frac{e^x}{(x+6)^2}$

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10. The integral

$$\int_0^1 \frac{1}{2+\sqrt{2e}}\,dae$$

is: (1) $\frac{1}{2}\ln(2+\sqrt{2e})$

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

(3) $\frac{1}{\sqrt{2}}\ln(2+\sqrt{2e})$

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

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11. The integral

$$\int e^x\left(\frac{x+5}{(x+6)^2}\right)dx$$

is: (1) $\frac{e^x}{x+6}$

(2) $-\frac{e^x}{x+6}$

(3) $\frac{e^x}{(x+6)^2}$

(4) $-\frac{e^x}{(x+6)}$

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12. If a and b are non-coplanar unit vectors such that

$$\mathbf{a}\times(\mathbf{b}\times\mathbf{c})=\frac{\mathbf{b}}{2}$$

then the angle between a and b is: (1) $\frac{\pi}{4}$

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

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

(4) $\frac{\pi}{6}$

13. If a random variable X has the following probability distribution values

X	0	1	2	3	4	5	6	7
$P(X)$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$

Then $P(X \geq 6)$ has the value (1) $\frac{16}{100}$

(2) $\frac{81}{100}$

(3) $\frac{1}{100}$

(4) $\frac{91}{100}$

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14. In $\triangle ABC$, with usual notations,

$\sin\left(\frac{A}{2}\right)\cdot\sin\left(\frac{C}{2}\right) = \sin\left(\frac{B}{2}\right)$ and $2s$ is the perimeter of the triangle. Find the value of s.

Then the value of s is: (1) $2b$

(2) $6b$

(3) $3b$

(4) $4b$

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15. Evaluate the limit

$$\lim_{n\to\infty} \frac{6^n - 9x - 7^n + 1}{\sqrt{2} - \sqrt{11} + \cos n}$$