MHT CET 2025 20 April Shift 1 Question Paper

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

1. Water is being poured at the rate of 36 m^3/min into a cylindrical vessel whose circular base is of radius 3 meters. Then the water level in the cylinder increases at the rate of:

(1) 4π m/min

(2) $\frac{4}{\pi}$ m/min

(3) $\frac{1}{4\pi}$ m/min

(4) $\frac{\pi}{4}$ m/min

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2. If $\mathrm{a} = 2\hat{i} + 2\hat{j} + 3\hat{k}, \mathrm{b} = -\hat{i} + 2\hat{j} + \hat{k}$ and $\mathrm{c} = 3\hat{i} + \hat{j}$ are the vectors such that $\mathrm{a} + \lambda\mathrm{b}$ is perpendicular to c, then the value of λ is:

(1) 6

(2) -6

(3) 8

(4) -8

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3. If $\cos^{-1}\left(\frac{12}{13}\right) + \sin^{-1}\left(\frac{3}{5}\right) = \sin^{-1} P$, then the value of P is:

(1) $\frac{63}{65}$

(2) $\frac{56}{65}$

(3) $\frac{48}{65}$

(4) $\frac{36}{65}$

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4. The area enclosed between the parabola $y^2 = 4x$ and the line $y = 2x - 4$ is:

(1) $\frac{17}{3}$ sq. units

(2) 15 sq. units

(3) $\frac{19}{3}$ sq. units

(4) 9 sq. units

5. If $y = \tan^{-1}\left(\frac{2+3x}{3-2x}\right) + \tan^{-1}\left(\frac{4x}{1+5x^2}\right)$**, then**

$$\frac{dy}{dx} =$$

(1) $\frac{1}{1+25x^2}$

(2) $\frac{5}{1+25x^2}$

(3) $\frac{1}{1+5x^2}$

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

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6. The particular solution of the differential equation,

$$xy\frac{dy}{dx} = x^2 + 2y^2 \quad \text{when} \quad y(1) = 0 \quad \text{is:}$$

(1) $\frac{x^2+y^2}{x^3} = 1$

(2) $x^2 + y^2 = x$

(3) $x^2 + y^2 = x^4$

(4) $x^2 + 2y^2 = x^4$

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7. If the angle between the line $2(x+1) = y = z$ **and the plane** $2x - y + \sqrt{2}z + 4 = 0$ **is** $\frac{\pi}{6}$**, then the value of** λ **is:**

(1) $\frac{135}{7}$

(2) $\frac{45}{11}$

(3) $\frac{45}{7}$

(4) $\frac{135}{11}$

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8. If the volume of the tetrahedron, whose vertices are $A(1,2,3), B(-3,-1,1), C(2,1,3)$ **and** $D(-1,2,x)$**, is** $\frac{11}{6}$ **cubic units, then the value of** x **is:**

(1) 3

(2) -2

(3) 4

(4) -1

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9. A 5-ohm resistor is connected to a 10 V battery. Calculate the current flowing through the resistor.

(A) 1.0 A

(B) 2.0 A

(C) 0.5 A

(D) 0.2 A

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10. A charge of 2 μC is placed in an electric field of intensity 4×10^3 N/C. What is the force experienced by the charge?

(A) 8×10^{-3} N

(B) 8×10^{-6} N

(C) 4×10^{-3} N

(D) 4×10^{-6} N

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