

MHT CET 2023 Question Paper with Answers and Solution May 12 Shift 2 (Memory-based)

Question 1. Solve for x, given $\tan^{-1}(1 - x/1 + x) = \frac{1}{2} \tan^{-1}x$

Answer. $x = \sqrt{3}$

Question 2. $\lim_{x \rightarrow 0} x \cot 4x / (\sin^2 x \cot^2(2x))$

Answer. 1

Question 3. $\int 1/(\cos^3 x \cdot \sqrt{\sin 2x}) dx = ?$

Answer. $\sqrt{2} (\sqrt{\tan x} + \frac{1}{5}(\tan x)^{5/2})$

Question 4. The solution of $e^{y-x} dy/dx = y(\sin x + \cos x)/(1 + y \log y)$

Answer. $e^y(\log y) = e^x \sin x + c$

Question 5. $\int (\tan(1/x) / x)^2 dx = ?$

Answer. $-\{\tan(1/x) - (1/x)\} + c$

Question 6. $\int 1 / [(x + 2)(1 + x)^2] dx = ?$

Answer. $\log|(x + 2)/(x + 1)| - 1/(1 + x) + c$

Question 7. $\int 1 / \cos^3 x \sqrt{\sin 2x} dx = ?$

Answer. $1/\sqrt{2} \{2\sqrt{t} + \int t^{3/2} dt\}$ where $t = \tan x$ and $\sec^2 x dx = dt$

Question 8. If a pair of line given by $(x \cos \alpha + y \sin \alpha)^2 = (x^2 + y^2) \sin^2 \alpha$ are perpendicular. What is the value of α ?

Answer. $\alpha = \pi/4$

Question 9. Find $\cos^2 48^\circ - \sin^2 12^\circ$, if $\sin 18^\circ = (\sqrt{5} - 1)/4$

Answer. $(\sqrt{5} + 1)/8$

Question 10. If $A = \begin{bmatrix} 2a & -3b \\ 3 & 2 \end{bmatrix}$

and $\text{adj}A = AA^T$, then $2a + 3b$ is?

Answer. 5

Question 11. $f(x) = x^2 + 1$, $g(x) = 1/x$. Find $f(g(g(f(x))))$ at $x = 1$

- A. 4
- B. 1
- C. 5
- D. 3

Answer. C) 5

Question 12. Find $\sum (x - x_i)^2 = 100$, no. of observations = 20, $\sum x_i = 20$.

Question 13. Vertices of Tetrahedron is $(1, 4, 3)$, $(2, 5, -6)$, $(3, -x, 5)$ and $(1, -6, -3)$ and volume of the tetrahedron is $11/6$ cubic unit. Then x is?

Question 14. K_i are possible values of K for which lines

$$Kx + 2y + 2 = 0,$$

$$2x + Ky + 3 = 0,$$

$$3x + 3y + K = 0$$

are concurrent, then $\sum k_i$ has value.

- A. 0
- B. -2
- C. 2
- D. 5

Question 15. The equation of the normal to the curve $3x^2 + y^2 = 8$, which is parallel to the line $x + 3y = 10$ is ?