

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

**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  $\alpha$ ?**

**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 ?

