MHT CET 2023 Question Paper Shift 2

Question 1. $\int 1 / [(x + 2)(1 + x)^2]\, dx = ?$
Answer. $\log|(x + 2)/(x + 1)| - 1/(1 + x) + c$

Question 2. $\int (\tan(1/x) / x)^2 dx = ?$
Answer. $-\{\tan(1/x) - (1/x)\} + c$

Question 3. $\int 1/(\cos^3 x.\sqrt{\sin 2x})\, dx = ?$
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. $\lim_{x \to 0} x.\cot 4x / (\sin^2 x \cot^2(2x))$
Answer. 1

Question 6. Solve for x, given $\tan^{-1}(1 - x/1 + x) = \frac{1}{2} \tan^1 x$
Answer. $x = \sqrt{3}$

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 $\cos^2 48^o - \sin^2 12^o$, if $\sin 18^o = (\sqrt{5} - 1)/4$
Answer. $(\sqrt{5} + 1)/8$

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

and $adjA = AA^T$, 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**