IIITB COMET FOUNDATION

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CBSE Class XII – Mathematics

Multiple Choice Questions

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1. If $\frac{d}{dx}f(x) = 2x + \frac{3}{x}$ and $f(1) = 1$, then $f(x)$ is
   (A) $x^2 + 3\log|x| + 1$
   (B) $x^2 + 3\log|x|$
   (C) $2 - \frac{3}{x^2}$
   (D) $x^2 + 3\log|x| - 4$

2. Degree of the differential equation $\sin x + \cos\left(\frac{dy}{dx}\right) = y^2$ is
   (A) 2
   (B) 1
   (C) not defined
   (D) 0

3. The integrating factor of the differential equation $(1-y^2)\frac{dx}{dy} + yx = ay,\ (-1 < y < 1)$ is
   (A) $\frac{1}{y^2-1}$
   (B) $\frac{1}{\sqrt{y^2-1}}$
   (C) $\frac{1}{1-y^2}$
   (D) $\frac{1}{\sqrt{1-y^2}}$

4. Unit vector along $\vec{PQ}$, where $P(2, 1, -1)$ and $Q(4, 4, -7)$ is
   (A) $2\hat{i} + 3\hat{j} - 6\hat{k}$
   (B) $-2\hat{i} - 3\hat{j} + 6\hat{k}$
   (C) $\frac{-2\hat{i}}{7} - \frac{3\hat{j}}{7} + \frac{6\hat{k}}{7}$
   (D) $\frac{2\hat{i}}{7} + \frac{3\hat{j}}{7} - \frac{6\hat{k}}{7}$

5. If in $\triangle ABC$, $\vec{BA} = 2\vec{a}$ and $\vec{BC} = 3\vec{b}$, then $\vec{AC}$ is
   (A) $2\vec{a} + 3\vec{b}$
   (B) $2\vec{a} - 3\vec{b}$
   (C) $3\vec{b} - 2\vec{a}$
   (D) $-2\vec{a} - 3\vec{b}$

6. If $|\vec{a} \times \vec{b}| = \sqrt{3}$ and $\vec{a} \cdot \vec{b} = -3$, then the angle between $\vec{a}$ and $\vec{b}$ is
   (A) $\frac{2\pi}{3}$
   (B) $\frac{\pi}{6}$
   (C) $\frac{\pi}{3}$
   (D) $\frac{5\pi}{6}$

7. Equation of the line passing through origin and making $30°, 60°, 90°$ with x, y, z axes respectively is
   (A) $\frac{2x}{\sqrt{3}} = \frac{y}{2} = \frac{z}{0}$
   (B) $\frac{2x}{\sqrt{3}} = \frac{2y}{1} = \frac{z}{0}$
   (C) $2x = \frac{2y}{\sqrt{3}} = \frac{z}{1}$
   (D) $\frac{2x}{\sqrt{3}} = \frac{2y}{1} = \frac{z}{1}$

8. If $P(A|B) = 2P(B|A)$ and $P(A) + P(B) = \frac{2}{3}$, then $P(B)$ is
   (A) $\frac{2}{9}$
   (B) $\frac{7}{9}$
   (C) $\frac{4}{9}$
   (D) $\frac{5}{9}$

9. Anti-derivative of $\frac{\tan x - 1}{\tan x + 1}$ is
   (A) $\sec^2\left(\frac{\pi}{4} - x\right) + c$
   (B) $-\sec^2\left(\frac{\pi}{4} - x\right) + c$
   (C) $\log\left|\sec\left(\frac{\pi}{4} - x\right)\right| + c$
   (D) $-\log\left|\sec\left(\frac{\pi}{4} - x\right)\right| + c$

10. If $(a, b), (c, d), (e, f)$ are vertices of $\triangle ABC$ and Δ is its area, then

$$\left| \begin{pmatrix} a & c & e \\ b & d & f \\ 1 & 1 & 1 \end{pmatrix} \right|^2$$

    is equal to

(A) $2\Delta^2$

(B) $4\Delta^2$

(C) 2Δ

(D) 4Δ

11. The function $f(x) = x|x|$ is

(A) continuous and differentiable at $x = 0$

(B) continuous but not differentiable at $x = 0$

(C) differentiable but not continuous at $x = 0$

(D) neither differentiable nor continuous at $x = 0$