IEM KOLKATA

Algebra

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Q1) What wil be the product of $\sqrt{2}, \sqrt[3]{3}, \sqrt[6]{5}$?

Q2) Find $(m^2 + m^{-2})$, when it is given that, $m = 9 + \sqrt{43}$

Q3) What will be the value of $\left(\sqrt{1+m} + \sqrt{1-m}\right)$, given $m = 4/5$.

Q4) $3x + 4|y| = 33$. How many integer values of (x, y) are possible?
(a) 6 (b) 3 (c) 4 (d) More than 6

Q5) If a, b, c are real numbers $a^2 + b^2 + c^2 = 1$, then the set of values $ab + bc + ca$ can take is:
(a) $[-1, 2]$ (b) $\left[-\frac{1}{2}, 2\right]$ (c) $[-1, 1]$ (d) $\left[-\frac{1}{2}, 1\right]$

Q6) $\left(3 + 2\sqrt{2}\right)^{\left(x^2-3\right)} + \left(3 - 2\sqrt{2}\right)^{\left(x^2-3\right)} = b$. Which of the following can be the value of b?
(a) 2 (b) $\sqrt{2}$ (c) $-\sqrt{2}$ (d) All of the above

Q7) If $\left(a + b\sqrt{3}\right)^2 = 52 + 30\sqrt{3}$,where a and b are natural numbers, then $a + b$ equals
(a) 7 (b) 10 (c) 8 (d) 9

Q8) The roots α, β of the equation $3x^2 + \lambda x - 1 = 0$, satisfy $\frac{1}{\alpha^2} + \frac{1}{\beta^2} = 15$. The value of $(\alpha^3 + \beta^3)^2$, is
(a) 9 (b) 16 (c) 4 (d) 1

Q9) If $\sqrt{5x+9} + \sqrt{5x-9} = 3(2 + \sqrt{2})$, then $\sqrt{10x+9}$ is equal to
(a) $4\sqrt{5}$ (b) $2\sqrt{7}$ (c) $3\sqrt{31}$ (d) $3\sqrt{7}$