ST. JOSEPH STUDY CENTRE

12th STD: Unit Test-8 **MATHS** **Time: 1 Hr / Total Marks: 25**

I. Answer any 5 of the following questions: **[5 x 2 = 10]**

1. Show that the equation $x^9 - 5x^5 + 4x^4 + 2x^2 + 1 = 0$ has atleast 6 imaginary solutions.
2. Solve the equation $3x^3 - 16x^2 + 23x - 6 = 0$ if the product of two roots is 1.
3. If α, β and γ are the roots of the polynomial equation $ax^3 + bx^2 + cx + d = 0$, find the value of $\sum \frac{\alpha}{\beta\gamma}$ in terms of the coefficients.
4. Solve $\tan^{-1}\left(\frac{1-x}{1+x}\right) = \frac{1}{2}\tan^{-1} x$ for $x > 0$.
5. Find the value of $\sin^{-1}\left(\sin\frac{5\pi}{9}\cos\frac{\pi}{9} + \cos\frac{5\pi}{9}\sin\frac{\pi}{9}\right)$
6. Find the value of $\tan\left(\sin^{-1}\frac{3}{5} + \cot^{-1}\frac{3}{2}\right)$

II. Answer any 3 of the following questions: **[3 x 5 = 15]**

7. Solve: $8x^{\frac{3}{2n}} - 8x^{\frac{-3}{2n}} = 63$.
8. Solve the equations: $6x^4 - 35x^3 + 62x^2 - 35x + 6 = 0$.
9. If $a_1, a_2, a_3 \ldots a_n$ is an arithmetic progression with common difference d,

   Prove that $\tan\left[\tan^{-1}\left[\frac{d}{1+a_1a_2}\right] + \tan^{-1}\left(\frac{d}{1+a_2a_3}\right) + \cdots + \tan^{-1}\left(\frac{d}{1+a_na_{n-1}}\right)\right] = \frac{a_n - a_1}{1+a_1a_n}$.
10. Solve $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$, if $6x^2 < 1$.

----------ALL THE BEST----------

Test should be written under the supervision of your parents and get the answer paper signed from them.

No corrections should be made after the test timings. We expect your honesty.

Test Papers have to be submitted after the completion of all the 4 tests.

Submission Date of Test Papers: 1st November, 2nd November, 3rd November Timings: 9 AM – 12.30 PM / 5 PM- 7 PM