Bose Einstein Scholarship Test

An endeavour of International Research Scholars and Mentors with JMMC Research Foundation

Sample Question for Class - 8

1. If $x^2 + y^2 = \theta_3 xy$, $y^2 + z^2 = \theta_1 yz$, and $z^2 + x^2 = \theta_2 zx$
   Then $\theta_1^2 + \theta_2^2 + \theta_3^2 - \theta_1\theta_2\theta_3 = ?$
   (a) 0 (b) 2 (c) 4 (d) 6

2. Find the value of λ
   Where $(99)^{\frac{1}{\lambda}} \times (99)^{\frac{2}{\lambda}} \times (99)^{\frac{3}{\lambda}} \times .... \times (99)^{\frac{2019}{\lambda}} = 970299$
   (a) 1359460 (b) 1534960 (c) 1349650 (d) 1345690

3. Find the number of digits in the number $2^{2019} \times 5^{2007}$ when written in full
   (a) 2007 (b) 2009 (c) 2011 (d) 2012

4. In a quadrilateral ABCD, reflect A at C to P, B at D to Q, C at A to R, D at B to S, then (area of ABCD) : (area of PQRS) is
   (a) 1 : 9 (b) 1 : 3 (c) 2 : 5 (d) 2 : 7

5. Find the remainder when 2^{2019} is divided by 19
   (a) 1 (b) 8 (c) 13 (d) 17

6. The sum of the powers of the vertices of a ΔABC, with respect to its nine point circle is
   (a) $\frac{1}{3}(a^2 + b^2 + c^2)$ (b) $\frac{1}{4}(a^2 + b^2 + c^2)$ (c) $\frac{1}{9}(a^3 + b^3 + c^3)$ (d) none of these

7. By Heron's formula we know that, area of $\Delta ABC = \Delta = \sqrt{S(S-a)(S-b)(S-c)}$ where, S = semiperimeter $= \frac{1}{2}(a + b + c)$ and a, b, c are the sides of the triangle. Now, if $r = \frac{\Delta}{S}$ and $r_a = \frac{\Delta}{S} - a$, then $r.r_a . r_b . r_c = ?$
   (a) $\frac{\Delta^2}{(S-a)(S-b)}$ (b) Δ^2 (c) $\frac{\Delta^3}{abc}$ (d) $\frac{\Delta^4}{Sabc}$

8. Find all natural numbers n such that the product of the non-zero digits of n is equal to $n^2 - 10n - 22$.
   (a) 5 (b) 9 (c) 12 (d) 14

9. A right circular cone has base of radius 1 unit and height 3 units. A cube is inscribed in the cone so that one face of the cube is contained in the base of the cone. What is the side-length of the cube ?
   (a) $\frac{(7\sqrt{3} - 6)}{9}$ units (b) $\frac{(9\sqrt{5} - 7)}{6}$ units (c) $\frac{(2\sqrt{7} - \sqrt{5})}{9}$ units (d) $\frac{(9\sqrt{2} - 6)}{7}$ units