1. Find all primes of the form $n^3 - 1$ for natural number 'n'.
2. Use the euclidean algorithm to find the greatest common divisor of a = 25174 and b = 42722. Exppren this as a linear combination of a and b.
3. A square has tens digits '7'. What is the units digit?
4. How many integers 'x' in {1, 2, 3.....99, 100} are there such that $x^2 + x^3$ is the square of an integer?
5. Find the sides in integers of a right triangle whose area is $5\frac{1}{2}$.
6. A sequence of positive integers is given by $a_1 = 1$ and a_n = g.c.d. $(a_{n-1}, n) + 1$ for $n > 1$. Then calculate a_{2002}.
7. What is the largest number of zero's that are occurs at the end of $1^n + 2^n + 3^n + 4^n$ for any positive integers 'n'.
8. What is the number of solution (x, y) with 'x' and 'y' as non negative integers of equation $4^x - 9^y = 55$
9. a, b, c are three numbers such that satisfying all four conditions.
(i) $abc \neq a$ (ii) $a + b + c = abc$ (iii) $(a + b)(b + c)(c + a) \neq 0$
(iv) $\frac{(a+b)}{1-ab}+\frac{b+c}{1-bc}+\frac{c+a}{1-ac} = k\ abc$ then
(A) k is constant (B) The value of 'k' depends on the value of a,b,c (C) k = 0
(D) k = 1 (E) k = – 1
10. Solve for 'x' if
(i) x is 5 digit number (ii) x is divisible by '11' and
(iii) x has '1' in its units, hundreds and thousand and ten thousand
11. In a number system written to a perticular base the following equality holds good "10000 = 7727 + 51" find the base.
12. If a and b are odd positive integers and $a^3 - b^3$ is divisible by 2^n ('n' is positive integers prove that 'a – b' is divisible by 2^n.
13. Let 'n' be a product of four consecutive positive integers then
(i) n + 1 is always perfect square (ii) 'n' is never a perfect square
(iii) 'n' is always divisible by 24 (iv) 'n + 2' is always perfect square
which of above options are correct?
14. The numerator of fraction is less then its denominator by '2'. When '1' is added to both numerator and denominator, we get another fraction. The sum of these two fractions is $\frac{19}{15}$. Find the fractions.
15. Given any integer p, prove that integer 'm' and 'n' can be found such that p = 3m + 3n.
16. The smallest positive integer 'k' such that (2000) (2001) k is a perfect cube.
17. Let m = 2001! and n = 2002 Ч 2003 Ч 2004. The L.C.M. of 'm' and 'n' is :
(i) m (ii) 2002 m (iii) 2003 m (iv) mn (v) none
18. 'n' is the smallest positive integer such that (2001 + n) is the sum of the cubes of the first 'm' natural numbers. Then find m and n.
19. 'm' is the right most non-zero disit of $(n!)^4$. Where $n \in z^+$ & $n > 1$. Determine the possible value of 'm'.
20. The sides of right angled triangle have lengths, which are integers in arithmetic progression. There exists such a triangle with smallest side having length of
(A) 2000 (B) 2001 (C) 2002 (D) 2003 (E) 1999