Number System-01-Classification of Numbers

1. Convert each of the following recurring number to p/q form where p and q are integers.

   i. $0.\overline{123}$ ii. $0.1\overline{23}$ iii. $0.12\overline{3}$ iv. $0.\overline{102}$ v. $0.10\overline{2}$

   vi. $0.0\overline{102}$ vii. $0.\overline{0102}$ viii. $0.0\overline{102}$ ix. $0.\overline{0120}$ x. $0.000\overline{2}$

2. a & b are two single digit natural numbers such that $0.ababab\ldots\ldots = \frac{8}{11}$. Find the value of $a + b$.

   1. 8 2. 9 3. 10 4. 11 5. 12

3. If $\frac{x}{0.1010\ldots\ldots} = \frac{1}{0.222\ldots\ldots}$, find the value of x.

   1. 0.444..... 2. 0.555..... 3. 0.4545..... 4. 0.5454..... 5. None of these

4. a and b are two single digit natural numbers such that $0.abab\ldots\ldots \times n$ is an integer value for all values of a and b. What is the least three digit number that n can be?

   1. 990 2. 999 3. 108 4. 198 5. 199

5. If $0.abcabc\ldots = \frac{17}{37}$, find the sum $a + b + c$.

   1. 18 2. 21 3. 24 4. 27 5. None of these

Directions for questions 6 to 15: Fill in the blanks with any one of the following:

1. always even 2. always odd 3. could be even also or odd also

6. $x^3 + x^4$ is _____.

7. $xy^2 + x^2y$ is _____.

8. If $3a + 1$ is even, then a is _____.

9. If $5a - 3$ is odd, then a is _____.

10. If $4a + 2$ is even, then a is _____.

11. If $7a - 4$ is even, then a is _____.

12. If $11a + 10$ is odd, then a is _____.

13. If $10a - 7$ is odd, then a is _____.

14. If $a \times b \times c$ is odd, then $ab + bc + ca$ is _____.

15. $(a - b) \times (b - c) \times (c - a)$ is _____.

Directions for 16 & 17: Choose the correct answer option.

16. Let x, y, and z be distinct integers. x and y are odd and positive and z is even and positive. Which one of the following statements cannot be true?

    1. $(x-z)^2 \times y$ is even
    2. $(x-z) \times y^2$ is odd
    3. $(x-z) \times y$ is odd
    4. $(x-y)^2 \times z$ is even

17. Let x, y and z be distinct integers that are odd and positive. Which of the following statements cannot be true?

    1. $x \times y \times z^2$ is odd
    2. $(x-y)^2 \times z$ is even
    3. $(x+y-z)^2 \times (x+y)$ is even
    4. $(x-y) \times (y+z) \times (x+y-z)$ is odd

18. State true or false for each of the following:

i. All prime numbers are odd — True / False

ii. Product of any two prime numbers could be prime — True / False

iii. Sum of any two prime numbers is always odd — True / False

iv. Difference of any two prime numbers is always even — True / False

19. If p is a prime number greater than 3, what is the remainder when

i. p is divided by 6?

1. 1 2. 5 3. 1 or 5 4. 2 or 3 5. Cannot be determined

ii. p^2 is divided by 6?

1. 1 2. 5 3. 1 or 5 4. 2 or 3 5. Cannot be determined

Directions for questions 20 to 25: Select the correct answer option.

20. In how many ways can 72 be written as a product of two co-prime natural numbers?

    1. 6 2. 5 3. 3 4. 2 5. 1

21. If a, $a + 2$, $a + 4$ are all prime numbers, how many distinct values can a take?

    1. 0 2. 1 3. 2 4. 3 5. More than 3

22. Let p be a prime number greater than 3. Then what is the remainder when $(p^2 + 17)$ is divided by 12?

    1. 3 2. 6 3. 8 4. 9 5. 16

23. If p and q are prime numbers greater than 3 then the greatest number by which $(p^2 - q^2)$ is always divisible is

    1. 12 2. 18 3. 24 4. 30 5. 36

24. How many prime numbers are of the form $n^3 - 1$, where n is any natural number?

    1. 0 2. 1 3. 2 4. 3 5. More than 3

25. How many primes cannot be expressed as a difference of squares of two natural numbers?

    1. 0 2. 1 3. 2 4. 3 5. More than 3