CHAPTER-1 | Real Numbers

QUIZ-01

1. What does the Fundamental Theorem of Arithmetic state?
   A. Every natural number is even
   B. Every composite number has a unique prime factorisation
   C. Prime numbers can be factorised
   D. Only even numbers have unique factors (B)

Explanation : The theorem states that every composite number can be expressed as a product of primes in a unique way, apart from the order of the primes.

2. What is the HCF of 96 and 404 using prime factorisation?
   A. 2 B. 4
   C. 8 D. 12 (B)

Explanation : $96 = 2^5 \times 3$ and $404 = 2^2 \times 101$. Common prime factor is 2 with smallest power $2^2 = 4$.

3. Which number cannot end with 0 for any natural number n?
   A. 5^n B. 10^n
   C. 4^n D. 6^n (C)

Explanation : 4^n has only 2 as a prime factor. It must have 5 as a factor to end in 0.

4. If p is a prime and p divides a^2, then p also divides:
   A. a + 1 B. $a^2 + p$
   C. a D. None of these (C)

Explanation : If p divides a^2, it must divide a. This uses the uniqueness of prime factorisation.

5. Which of the following is used to find the HCF of two numbers using primefactorisation method?
   A. Largest power of all primes
   B. Sum of the numbers
   C. Smallest power of common primes
   D. Difference of the numbers (C)

Explanation : HCF is obtained by multiplying the smallest powers of all common prime factors.

6. What does the contradiction in proving $\sqrt{2}$ irrational indicate?
   A. $\sqrt{2}$ is rational
   B. a and b are always even
   C. Assumption is wrong
   D. a = b always (C)

Explanation : The contradiction arises as both a and b become divisible by 2, contradicting coprime assumption.

7. LCM of two numbers is found using which rule in prime factorisation?
   A. Smallest powers of primes
   B. Greatest powers of all primes
   C. Only common primes
   D. Addition of all primes (B)

Explanation : LCM is calculated by taking the highest powers of all the primes involved.

8. Which mathematician gave the first correct proof of the Fundamental Theorem ofArithmetic?
   A Newton B. Euclid
   C. Carl Gauss D. Archimedes (C)

Explanation : Carl Friedrich Gauss provided the first correct proof in Disquisitiones Arithmeticae.

9. Which of the following expressions is a composite number?
   A. 7 × 1 1 × 13 + 13 B. 5 × 6 + 7
   C. 3 × 2 + 1 D. 4 + 5 (A)

Explanation : 7 × 11 × 13 + 13 = 1001 + 13 = 1014 which is divisible by 13, hence composite.

10. Which method is used in the proof that $\sqrt{3}$ is irrational?
    A. Euclid's lemma
    B. Proof by contradiction
    C. Factor tree
    D. Decimal expansion method (B)

Explanation : The proof uses the contradiction technique assuming $\sqrt{3}$ is rational, leading to conflict in coprime condition.