NARSIMHAREDDY ENGINEERING COLLEG

(UGC AUTONOMOUS)

II B.Tech , I Semester (NR25)

MATHEMATICAL AND STATISTICAL FOUNDATIONS (25MA301)

UNIT – I

BASIC NUMBER THEORY

Multiple Choice Questions

1. The greatest common divisor (GCD) of two integers is [c]

A) Their sum

B) Their smallest common factor

C) **The largest positive integer that divides both numbers**

D) Their product

2. The GCD of 24 and 36 is [b]

A) 6 B) **12** C) 18 D) 24

3. The Euclidean algorithm is used to find [c]

A) Prime numbers

B) Multiples of numbers

C) **Greatest common divisor (GCD)**

D) Squares of numbers

4. According to the Euclidean algorithm, if $a = bq + r$, then [c]

A) GCD (a, b) = q

B) GCD (a, b) = r

C) **GCD (a, b) = GCD (b, r)**

D) GCD (a, b) = a + b

5. Which theorem states that every integer greater than 1 can be expressed uniquely as a product of primes [d]

A) Euclid's Lemma

B) Pythagoras Theorem

C) Fermat's Little Theorem

D) **Fundamental Theorem of Arithmetic**

6. Which of the following is a prime factorization of 84 [b]

A) 2 × 42

B) **$2^2 \times 3 \times 7$**

C) 4 × 21
D) 6 × 14

7. Which number is a prime [c]
A) 21
B) 35
C) **29**
D) 39

8. The GCD of two coprime numbers is [c]
A) 0
B) 2
C) **1**
D) Their product

9. The first Fermat number is [c]
A) 5
B) 17
C) **3**
D) 257

10. The general form of the Fermat numbers is [c]
A) $2^n + 1$
B) $2^{n+1} - 1$
C) $2^{2^n} + 1$
D) $n^2 + 1$

11. Which of the following Fermat numbers is composite [d]
A) 3
B) 5
C) 17
D) **4294967297**

12. Which of the following is true [c]
A) Every even number is prime.
B) Every odd number is prime.
C) **Every integer greater than 1 has a prime factorization.**
D) Every integer has only one factor.

13. The prime factorization of 72 is [b]
A) 2 × 36 B) **$2^3 \times 3^2$**
C) 8 × 9 D) 6 × 12

14. The Euclidean algorithm stops when [b]
A) The quotient becomes 1

B) **The remainder becomes 0**
C) The dividend becomes 1
D) The divisor becomes 2

15. The GCD of 48 and 180 is [b]
A) 6 B) **12** C) 18 D) 24

FILL IN THE BLANKS

1. The greatest common divisor of two integers is also called the Greatest Common Factor (GCF)

2. The Euclidean algorithm is used to find the greatest common divisor of two integers

3. If the remainder is zero in the Euclidean algorithm, the last divisor is the GCD

4. Every integer greater than 1 can be written uniquely as a product of prime numbers .

5. The Fundamental Theorem of Arithmetic deals with prime factorization .

6. The prime factorization of 60 is $2^2 \times 3 \times 5$

7. Two numbers whose GCD is 1 are called coprime numbers .

8. The GCD of 15 and 25 is 5

9. The first five Fermat numbers are 3, 5, 17, 257, and 65537.

10. Fermat numbers are of the form $2^{2^n} + 1$

11. The number 4294967297 is the fifth Fermat number.

12. The GCD of 18 and 30 is 6

13. The prime factorization of 100 is $2^2 \times 5^2$

14. Every prime number has exactly two positive divisors two

15. The Euclidean algorithm is based on repeated division with remainder division .