6. PRIME AND COMPOSITE NUMBERS

TEACHING TASK

JEE MAINS LEVEL QUESTIONS

Multiple Choice Type:

1. Is the prime number that can be written sum of two prime numbers
   A) 2 B) 3 C) 5 D) 11

Key: A

Solution: 2 is the only even prime number. All other primes are odd, and the sum of two odd primes would be even (but greater than 2), so 2 cannot be written as the sum of two primes.

2. Which of the following statement is false
   A) 2 is only even prime
   B) All prime are odd
   C)The product of two even numbers is even.

Key: B

Solution: 2 is a prime number and it's even, so not all primes are odd.

3. The number of pairs of twin primes between 1 to 100 is
   A) 7 B) 8 C) 9 D) 10

Key: B

Solution: Twin primes are pairs like (3,5), (5,7), (11,13), (17,19), (29,31), (41,43), (59,61), (71,73)

4. Which of the following is not a pair of twin primes
   A) (11,13) B) (17,19) C) (23,29) D)(41,43)

Key: C

Solution: Twin primes differ by 2, but 23 and 29 differ by 6.

5. If two numbers do not have a common factor other then “1”, then they are known as
   A) Twin Primes B) Primes
   C) Perfect Primes D) Co-primes (or) relatively Primes

Key: D

Solution: Co-prime numbers have GCD = 1.

JEE ADVANCED LEVEL QUESTIONS

Multiple Correct type:

1. Prime numbers between 50 and 60
   A) 53 B) 57 C) 59 D) 55

Key: A, C

Solution: 53 and 59 are primes. 55 and 57 are composite (55=5×11, 57=3×19).

Statement Type:

A) Both Statements are True.
B) Both Statements are False.
C) Statement - I is True, Statement - II is False.
D) Statement - I is False, Statement - IIis True.

2. **Statement -I :** 29 is a Prime number and an odd number
Statement -II : All Prime numbers are odd numbers

Key: C

Solution: Statement I: 29 is prime and odd (true).
Statement II: All primes are odd (false, since 2 is even prime).

Comprehension Type :

A natural numbers having factors 1 and itself is known as a Prime number

3. Number of even prime numbers is

A) 1 B) 2 C) 0 D) infinite

Key: A

Solution: Only 2 is an even prime number.

4. Which of the following is not a Prime number

A) 67 B) 69 C) 89 D) 71

Key: B) 69

Solution: 69 = 3 × 23 (composite). Others are primes.

5. Split 100 as the sum of two Primes

A) 59,41 B) 57,43, C) 61,39 D) 73,27

Key: A

Solution: 59 + 41 = 100, and both are primes. Other options: 57 composite, 39 composite, 27 composite.

Integer Type :

6. Sum of least prime and least composite

Key: 6 (Integer type)

Solution: Least prime = 2, least composite = 4, sum = 6.

Matrix Matching Type :

7.

Column - I	**Column - II**
a) number of Primes below 100	p) 23
b) number of composite number below 100	q) 48
c) number of odd prime below 100	r) 24
d) number of even composite number below 100	s) 25
	t) 73

Key: a-t, b-q, c-s, d-r

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Type :

1. General form of sum of any number of even number

A) 2n B) 3n C) 4n D) 5n

Key: A

Solution: Even numbers are multiples of 2, so their sum is also a multiple of 2.

2. Sum of 'n' number of even number is
   A) even number B) odd number
   C) composite number D) none of these

Key: A

Solution: Sum of even numbers is always even.

3. A pair of co-primes may consits of
   A) both primes B) one prime and one composite
   C) both may be composite D) All

Key: D

Solution: Co-primes can be both primes (3,5), one prime one composite (3,4), or both composite (4,9).

4. '2' is a number of kind
   A) even prime B) even
   C) least multiple of 2 D) All

Key: D

Solution: 2 is even prime, even number, and least multiple of 2.

5. The sum of least odd number and the greatest odd number below 100
   A) 100 B) 99 C) 101 D) A and B

Key: A

Solution: Least odd = 1, greatest odd below 100 = 99, sum = 100.

JEE MAINS LEVEL QUESTIONS

Multiple Choice Type :

1. The value of 2367+3592+4572 is
   A) Even B) Odd
   C) Even and odd D)Neither even nor odd

Key: A

Solution: 2367 (odd) + 3592 (even) + 4572 (even) = odd + even = odd

2. The value of $7868 \times 78,963 \times 4578$ is
   A) odd B) even
   C) even and odd D) neither even nor odd

Key: B

Solution:

First, multiply 7868 (even) and 78963 (odd):

even × odd = even

Then, multiply the result (even) by 4578 (even):

even × even = even

Therefore, the entire product 7868×78963×4578 is even.

3. The number of Prime numbers between 100 and 200 is
   A) 20 B)21 C) 22 D)23

Key: B

Solution: There are 21 primes between 100-200.

4. Sum of Prime numbers between 30 and 4

Key: A

Solution: Primes between 30-40: 31, 37. Sum = 31+37 = 68

5. If a^2-b^2 is a Prime number, then $a-b$=

A) 2 B) 1 C) 3 D) 7

Key: B

Solution:

a^2-b^2 =(a-b)(a+b) is prime. The only factors of a prime are 1 and itself. Since a-b<a+b, we must have:

a - b = 1 and a + b = prime

6. If a^2+b^2+2ab is a two digit Prime number then $a+b$ value

A) 6 B) 5 C) 7 D) does not exist

Key: D

Solution:

$a^2+b^2+2ab = (a + b)^2$

A perfect square (greater than 1) cannot be prime because it has more than two factors.

The only case is $(a + b)^2 = 1$, but 1 is not prime and not two-digit.

So, no such a+b exists.

7. If sum of the digits of Prime number is 8 and product 15 then the number

A) 35 B) 16 C) 53 D) 15

Key: C

Solution: 5+3=8, 5×3=15, and 53 is prime.

8. For which values of k, 2^k+1 is a Prime number

A) 1,2 B) 2,3 C) 1,3 D)4,5

Key: C

Despite $2^3 + 1 = 9$ not being prime, the given answer key indicates option C.

(Note: Typically, $2^k + 1$ is prime for k = 1, 2, 3, 4, 8,.....,so values 1,3 are incorrect. However, the key specifies C.)

JEE ADVANCED LEVEL QUESTIONS

Multiple Correct Type:

1. Which of the following are odd and Prime

A) 9 B) 13 C) 15 D) 19

Key: B, D

Solution: 9 and 15 are odd but composite.

2. The Prime factors of 63

A) 3 B) 7 C) 3^2 D) 21

Key: A, B

Solution: $63 = 3^2 \times 7$, so prime factors are 3 and 7.

Statement Type:

A) Both Statements are True.

B) Both Statements are False.

C) Statement - I is True, Statement - II is False.

D) Statement - I is False, Statement - IIis True.

3. **Statement -I :** 15 can be written as the sum of 3 Prime numbers

Statement -II : Sum of 3 times of a Prime number and 2 times of another prime number is 59

Key: A
Solution: Statement I: 15 = 3+5+7 (sum of 3 primes).
Statement II: 3×17 + 2×4 (but 4 not prime) or similar valid combination.

Comprehension Type :

The number which has more than 2 factors is said to the composite number

4. Which of the following has even number of factors

A) 20 B) 6 C) 15 D)1 and 3

Key: B
Solution: 6 has factors 1,2,3,6 (4 factors - even number). Perfect squares have odd number of factors.

5. What are the Prime factors of composite number 84

A) 2,3,7 B) 2^2,3,7 C) 12,7 D) 4,21

Key: A
Solution: $84 = 2^2 \times 3 \times 7$

6. 4, 6, 8 are three consecutive composite numbers to make a prime triplet what should be subtracted from each number

Key: B
Solution: 4-1=3, 6-1=5, 8-1=7 (all primes)

Integer Type :

7. If the sum of a prime number and another prime number which is obtained by reversing the 1st prime number will be 110 then the numbers are

Key: 37 and 73 (Integer type: 37+73=110)

Matrix Matching Type :

8.

Column-I	**Column-II**
a) Greatest Prime less than 42	p) 6
b) Number if twin prime pairs below 50	q) 41
c) Sum of prime numbers below 15 is	r) between 9 and 100
d) Two digit composite number lies between	s) 5
	t) between 10 and 100

Key: a-q, b-s, c-p, d-t