

Class X
Mathematics
Topic : Real Numbers

Maximum Marks: 15

Time: 35 Minutes

SECTION – A (1 mark each)

Q1. A positive integer n , when divided by 7, leaves a remainder 5. The remainder when $2n^2 + 3n$ is divided by 7 is:

- (a) 0 (b) 1 (c) 2 (d) 5

Q2. Two numbers are in the ratio 3 : 4 and their HCF is 4. Their LCM is:

- (a) 12 (b) 16 (c) 24 (d) 48

Q3. The product $2 \times 4 \times 6 \times 8 \times \dots \times 50$ can be expressed as:

- (a) $2^{25} \times 25!$
(b) $25!$
(c) $2^{25} \times 50!$
(d) $50! / 2^{25}$

SECTION – B (Assertion-Reason, 1 mark each)

Choose the correct option:

- (a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

Q4. Assertion (A): 12^n cannot end with the digit 0 for any natural number n .

Reason (R): For a number to end with the digit 0, its prime factorisation must contain both the primes 2 and 5.

Q5. Assertion (A): The square of any positive integer is of the form $3m$ or $3m + 1$.

Reason (R): Any positive integer can be expressed as $3q$, $3q + 1$ or $3q + 2$, and on squaring these forms, we get numbers of the form $3m$ or $3m + 1$.

SECTION – C (2 marks)

Q6. Using Euclid's division algorithm, find the HCF of 408 and 1032. Hence, find the value of m if the HCF can be expressed as $1032m - 408 \times 5$.

SECTION – D (3 marks)

Q7. Prove that $\sqrt{2} + \sqrt{3}$ is an irrational number.

SECTION – E (Case Study – $1 \times 5 = 5$ marks)

Q8. Three joggers start together from the same point on a straight track. Their step lengths are 40 cm, 48 cm and 60 cm. They wish to walk such that each covers the same minimum distance in complete steps and their footmarks align again.

Based on the above information, answer the following:

(i) To find the minimum distance that all three should walk, we need to compute the:

- (a) HCF of the step lengths
- (b) LCM of the step lengths
- (c) Sum of the step lengths
- (d) Product of the step lengths

(ii) The minimum distance each jogger should walk is:

- (a) 120 cm (b) 240 cm (c) 480 cm (d) 360 cm

(iii) Using the Fundamental Theorem of Arithmetic, the exponent of 2 in the prime factorisation of this minimum distance is:

- (a) 3 (b) 4 (c) 5 (d) 6

(iv) If the HCF of 40 and 48 is 8, then the LCM of 40 and 48 is:

- (a) 192 (b) 240 (c) 480 (d) 160

(v) Which of the following numbers is irrational?

- (a) $\sqrt{24}$
- (b) $\sqrt{49}$
- (c) $\sqrt{(48/3)}$
- (d) $\sqrt{(240 \times 10 / 2400)}$