

**SIKSHAM**

Mathematics | Computer | Coding &amp; Programming

**ADVANCED MOCK ASSESSMENT - X****Mathematics****Time Allowed: 1 Hour 30 Minutes****Maximum Marks: 50 (Written: 45 + Viva: 5)****General Instructions:**

- All questions are compulsory.
- Questions are modeled directly from high-frequency and standard board examination matrices.
- Section A contains 10 Multiple Choice Questions (1 mark each).
- Section B contains 5 Short Answer Type-I questions (2 marks each).
- Section C contains 5 Long Answer Type-I questions (3 marks each).
- Section D contains 2 Long Answer Type-II questions (5 marks each).
- Section E contains a 5-mark Viva-Voce oral evaluation sequence.

**SECTION A (10 MARKS)****1. Choose the correct answer from the given four options:****[1×10=10]**

a. If two positive integers  $m$  and  $n$  are expressible in the form  $m = xy^3$  and  $n = x^2y$ , where  $x, y$  are prime numbers, then  $HCF(m, n)$  is:

- (i)  $xy$  (ii)  $x^2y^3$   
(iii)  $x^2y$  (iv)  $xy^2$

b. The total number of factors of a prime number is:

- (i) 1 (ii) 2  
(iii) 0 (iv) 3

c. If one zero of the quadratic polynomial  $2x^2 - 3x + k$  is 1, then the value of  $k$  is:

- (i) 1 (ii) -1  
(iii) 2 (iv) -2

d. If the zeroes of a quadratic polynomial  $x^2 + (a + 1)x + b$  are 2 and -3, then:

- (i)  $a = 0, b = -6$  (ii)  $a = 2, b = -6$   
(iii)  $a = -7, b = -1$  (iv)  $a = 5, b = -1$

e. The unique value of  $k$  for which the system of linear equations  $kx - y = 2$  and  $6x - 2y = 3$  has a unique solution is:

- (i)  $k = 3$  (ii)  $k \neq 3$   
(iii)  $k \neq 0$  (iv)  $k = 0$

f. If the lines given by  $3x + 2ky = 2$  and  $2x + 5y + 1 = 0$  are parallel, then the value of  $k$  is:

- (i)  $\frac{15}{4}$  (ii)  $\frac{4}{15}$   
 (iii)  $\frac{-15}{4}$  (iv)  $\frac{-4}{15}$

g. The roots of the quadratic equation  $x^2 - 0.04 = 0$  are:

- (i)  $\pm 0.2$  (ii)  $\pm 0.02$   
 (iii)  $0.4$  (iv)  $2$

h. If the equation  $x^2 + 4kx + k = 0$  has real and equal roots, then the non-zero value of  $k$  is:

- (i)  $4$  (ii)  $\frac{1}{4}$   
 (iii)  $\frac{1}{2}$  (iv)  $1$

i. Every composite number can be uniquely expressed as a product of:

- (i) Even numbers (ii) Prime numbers  
 (iii) Odd numbers (iv) Natural numbers

j. If a pair of linear equations has infinitely many solutions, the lines are:

- (i) Parallel (ii) Intersecting  
 (iii) Coincident (iv) Perpendicular

### SECTION B (10 MARKS)

2. Explain clearly why the expression  $7 \times 11 \times 13 + 13$  represents a composite number. [2]

3. Find the zeroes of the quadratic polynomial  $\sqrt{3}x^2 + 10x + 7\sqrt{3}$  by using factorization. [2]

4. Solve the following system of linear equations by using the elimination method: [2]

$$\begin{aligned} 21x + 47y &= 110 \\ 47x + 21y &= 162 \end{aligned}$$

5. Find the non-zero value of  $p$  for which the quadratic equation  $px(x - 2) + 6 = 0$  has two equal roots. [2]

6. Form a quadratic equation whose roots are given as 5 and  $-2$ . [2]

### SECTION C (15 MARKS)

7. If the HCF of 408 and 1032 is expressible in the linear combination form  $1032m - 408 \times 5$ , determine the exact value of  $m$ . [3]

8. If  $\alpha$  and  $\beta$  are the zeroes of the quadratic polynomial  $f(x) = 4x^2 + 3x - 1$ , form a new quadratic polynomial whose zeroes are the reciprocals  $\frac{1}{\alpha}$  and  $\frac{1}{\beta}$ . [3]

9. Check whether the following system of equations is consistent or inconsistent. If consistent, solve it graphically: [3]

$$\begin{aligned}x + 3y &= 6 \\3y - 2x &= -12\end{aligned}$$

10. Solve the following equation for the value of  $x$  via factorization method: [3]

$$\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30} \quad (x \neq -4, 7)$$

11. Prove that the number  $5 - 3\sqrt{2}$  is irrational, given that  $\sqrt{2}$  is already known to be an irrational number. [3]

<b>SECTION D (10 MARKS)</b>
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12. Two years ago, a father was thrice as old as his daughter, and six years later, he will be four years older than twice her age. Formulate the pair of linear equations and solve it to find their present ages. [5]

13. A train travels a distance of 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Formulate the quadratic equation and find the original uniform speed of the train. [5]

<b>SECTION E (5 MARKS — VIVA VOCE ASSESSMENT LOOP)</b>
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14. Answer the following conceptual questions during oral evaluation: [1×5=5]

1. What is the HCF of two co-prime numbers? Give an example of a pair of co-prime numbers.
2. If a polynomial graph does not intersect or touch the  $x$ -axis at all, what can you conclude about its real zeroes?
3. State the algebraic condition on coefficients for a pair of linear equations to represent two parallel lines.
4. What type of roots does a quadratic equation have if its discriminant is strictly greater than zero and a perfect square?
5. Why can the natural number 6 raised to the power  $n$  never end with the digit 0 for any natural number  $n$ ? Explain the prime factor parameter.

--- END OF EXAM PAPER ---