SIKSHAM

Mathematics | Computer | Coding & 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.
- Read all questions carefully before attempting.
- 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 are written as 140 and n, and their HCF is 20 with an LCM of 420, then the value of n is:

(i) 60 (ii) 80

(iii) 120 (iv) 140

b. If the graph of a polynomial cuts the x-axis at exactly one point and touches it at another distinct point, the total number of real zeroes is:

(i) 1 (ii) 2

(iii) 3 (iv) 0

c. The value of k for which the pair of linear equations $x + 2y = 3$ and $5x + ky + 7 = 0$ has no solution is:

(i) 10 (ii) 5

(iii) –10 (iv) 2

d. If the sum of the zeroes of the quadratic polynomial $ax^2 + 6x + 4a$ is –3, then the value of a is:

(i) 2 (ii) –2

(iii) 4 (iv) –4

e. The discriminant value of the quadratic equation $2x^2 – 3x + 4 = 0$ is:

(i) 23 (ii) –23

(iii) 41 (iv) –41

f. If the system of linear equations $2x + 3y = 7$ and $2ax + (a + b)y = 28$ has infinitely many solutions, then:

(i) $b = 2a$ (ii) $a = 2b$

(iii) $b = 3a$ (iv) $a = 3b$

g. Which of the following quadratic equations has two distinct real roots?

(i) $x^2 + 3x + 5 = 0$ (ii) $2x^2 – 3x – 1 = 0$

(iii) $x^2 + 4x + 4 = 0$ (iv) $3x^2 + x + 2 = 0$

h. The value of k for which the quadratic equation $x^2 – kx + 9 = 0$ has equal roots is:

(i) ± 3 (ii) ± 6

(iii) ± 9 (iv) 0

i. The product of two consecutive positive integers is always divisible by:

(i) 2 (ii) 3

(iii) 4 (iv) 5

j. If one root of the quadratic equation $6x^2 – x – k = 0$ is $\frac{2}{3}$, then the value of k is:

(i) 2 (ii) –2

(iii) 3 (iv) 4

SECTION B (10 MARKS)

2. Find the HCF of 506 and 1155 by applying the prime factorization method. **[2]**

3. Find a quadratic polynomial whose zeroes are $\alpha = –4$ and $\beta = 3$. **[2]**

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

$$11x + 15y + 23 = 0$$
$$7x – 2y – 20 = 0$$

5. Find the value of k for which the quadratic equation $(k + 1)x^2 – 2(k – 1)x + 1 = 0$ has real and equal roots. **[2]**

6. Show that the number 9^n can never end with the digit 0 for any natural number value of n. **[2]**

SECTION C (15 MARKS)

7. Prove that the number $2 – 5\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is known to be irrational. **[3]**

8. Find the zeroes of the quadratic polynomial $3x^2 – x – 4$ and verify the relationship between its zeroes and coefficients. **[3]**

9. Solve the following pair of simultaneous linear equations by using the substitution method:

$$\frac{x}{2} + \frac{2y}{3} = -1 \quad \text{and} \quad x - \frac{y}{3} = 3$$ **[3]**

10. Solve the following quadratic equation by the factorization method: **[3]**

$$4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$$

11. If α and β are the zeroes of the quadratic polynomial $p(x) = 2x^2 + 5x + k$ such that $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, **[3]** find the exact value of k.

SECTION D (10 MARKS)

12. A part of monthly hostel charges is fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 20 days she has to pay Rs 1000 as hostel charges whereas a student B, who takes food for 26 days, pays Rs 1180 as hostel charges. Find the fixed charges and the cost of food per day. **[5]**

13. A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that the cost of production of each article (in rupees) was 3 more than twice the number of articles produced on that day. If the total cost of production on that day was Rs 90, find the number of articles produced and the cost of each article. **[5]**

SECTION E (5 MARKS — VIVA VOCE ASSESSMENT LOOP)

14. Answer the following conceptual questions during oral evaluation: **[1×5=5]**

1. What can you conclude about the decimal expansion of a rational number if its denominator has prime factors other than 2 or 5?
2. What is the maximum number of zeroes a polynomial of degree n can have?
3. Geometrically, what does a pair of linear equations with infinitely many solutions represent?
4. State the Sridharacharya Quadratic Formula and identify the condition for which a quadratic equation has no real roots.
5. Can the HCF of two numbers be greater than their LCM? Provide a brief conceptual proof for your reasoning.

--- END OF EXAM PAPER ---