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.
- 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 p and q can be expressed as $p = ab^2$ and $q = a^3b$, where a, b are prime numbers, then $LCM(p, q)$ is:

(i) ab (ii) a^2b^2

(iii) a^3b^2 (iv) a^3b^3

b. If the HCF of 65 and 117 is expressible in the form $65m – 117$, then the value of m is:

(i) 4 (ii) 2

(iii) 1 (iv) 3

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

(i) $\frac{4}{3}$ (ii) $\frac{-4}{3}$

(iii) $\frac{2}{3}$ (iv) $\frac{-2}{3}$

d. If the zeroes of the quadratic polynomial $ax^2 + bx + c$, $(c \neq 0)$ are equal, then:

(i) c and a have opposite signs (ii) c and b have opposite signs

(iii) c and a have the same sign (iv) c and b have the same sign

e. The pair of linear equations $2x + 3y = 5$ and $4x + 6y = 15$ has:

(i) a unique solution (ii) infinitely many solutions

(iii) no solution (iv) exactly two solutions

f. For what value of k do the linear equations $2x – 3y + 10 = 0$ and $3x + ky + 15 = 0$ represent coincident lines?

(i) $\frac{-9}{2}$ (ii) $\frac{9}{2}$

(iii) –5 (iv) –6

g. Which of the following is a quadratic equation?

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

(iii) $x + 5 = 0$ (iv) $x^2 + 2x + 1 = (4 – x)^2 + 3$

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

(i) 0 only (ii) 4

(iii) 8 only (iv) 0 and 8

i. The roots of the quadratic equation $x^2 – 25 = 0$ are:

(i) 25, –25 (ii) 5, –5

(iii) 5, 5 (iv) –5, –5

j. If the discriminant of a quadratic equation is negative, then its roots are:

(i) Real and equal (ii) Real and distinct

(iii) Not real / Imaginary (iv) Real and rational

SECTION B (10 MARKS)

2. Find the HCF of 96 and 404 by the prime factorization method. Hence, find their LCM. **[2]**

3. Find a quadratic polynomial whose zeroes are $3 + \sqrt{2}$ and $3 – \sqrt{2}$. **[2]**

4. Five years ago, Nuri was thrice as old as Sonu. Ten years later, Nuri will be twice as old as Sonu. Formulate the pair of linear equations representing this scenario. **[2]**

5. Verify whether $x = 2$ is a valid root of the quadratic equation $x^2 – 5x + 6 = 0$. **[2]**

6. Find the discriminant of the quadratic equation $2x^2 – 7x + 3 = 0$ and hence determine the nature of its roots. **[2]**

SECTION C (15 MARKS)

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

8. Find the zeroes of the quadratic polynomial $6x^2 – 3 – 7x$ and verify the relationship between the zeroes and its coefficients. **[3]**

9. Solve the following pair of linear equations by the elimination method:

$$3x + 4y = 10$$
$$2x - 2y = 2$$

[3]

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

$$x^2 - 11x + 30 = 0$$

11. If the sum of the roots of a quadratic equation is 5 and their product is 6, form the corresponding quadratic equation and find its exact roots. **[3]**

SECTION D (10 MARKS)

12. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Formulate the relevant quadratic equation and find the speed of the stream. **[5]**

13. A fraction becomes $\frac{9}{11}$, if 2 is added to both the numerator and the denominator. If 3 is added to both the numerator and the denominator, it becomes $\frac{5}{6}$. Formulate the pair of linear equations and find the original fraction. **[5]**

SECTION E (5 MARKS — VIVA VOCE ASSESSMENT LOOP)

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

1. State the conditions under which a decimal expansion of a rational number terminates.
2. What is the relationship between the degree of a polynomial and the maximum number of its real zeroes?
3. What are the geometric interpretations of a pair of linear equations that has a unique solution, no solution, and infinitely many solutions?
4. Define the discriminant of a quadratic equation and explain how it determines the nature of the roots.
5. State the Sridharacharya Quadratic Formula for finding the roots of a general quadratic equation $ax^2 + bx + c = 0$.

--- END OF EXAM PAPER ---