MATHEMATICS

Class XI

Sample Paper—2

Max. Marks: 50   **Time Allowed: 90 minutes**

General Instructions:

(i) This question paper consists of 45 questions in 5 sections.

(ii) All questions are compulsory.

(iii) Section A consists of 10 Multiple Choice Questions carrying 01 mark each.

(iv) Section B consists of 10 Fill in the Blanks Type Questions carrying 01 mark each.

(v) Section C consists of 10 True or False Statement Type Questions carrying 01 mark each.

(vi) Section D consists of 10 Very Short Answer Type Questions carrying 01 marks each.

(vii) Section E consists of 5 Short Answer Type Questions carrying 02 marks each.

Section A

Select and write one most appropriate option out of the four options given for each of the questions 1 – 10.

1. The value of 57 (mod 7) is

(a) 0   (b) 1

(c) 2   (d) 3

2. If $26 = 2 \bmod x$, the value of x is

(a) 5   (b) 7

(c) 8   (d) 9

3. The fraction $\dfrac{(\log_{10} 125)(\log_{10} 36)}{(\log_{10} 216)(\log_{10} 625)}$ when simplified is equivalent to

    (a) 2   (b) $\dfrac{1}{2}$

    (c) 1   (d) None of these

4. The number of solutions of the equation $\log_{10} 2x + \log_{10} (x - 4) = 1$ is

    (a) 1   (b) 2

    (c) 3   (d) 4

5. The value of $(14 + 3\sqrt{7})\left(2 - \dfrac{3}{\sqrt{7}}\right)$, when simplified, is

    (a) 7   (b) 13

    (c) 19   (d) 23

6. Let $*$ be a binary operation defined on reals such that $a * b = a^2 + 2ab + b^2$, then, value of $\sqrt{3} * \sqrt{12}$ is

    (a) 72   (b) 27

    (c) 17   (d) None of these

7. Mohammed deposited L\$ 9500 in a bank at 11% compound interest per annum. The compound interest at the end of 2nd year is

    (a) L\$ 1150   (b) L\$ 1160

    (c) L\$ 1170   (d) L\$ 1180

8. If $y \propto x^2$ and if $y = 18$ when $x = 6$, then, the value of y when $x = 8$ is

    (a) 12   (b) 24

    (c) 32   (d) 36

9. Let 11 men can dig $6\dfrac{3}{4}$ metre long trench in one day. To dig 27 metre long trench, the number of men to be employed is

    (a) 40   (b) 44

    (c) 50   (d) 54

10. If $y \propto$ partly as the square of x and y is partly a constant. Given that $y = 40$ when $x = 1$ and $y = 13$ when $x = 2$. The positive value of x when $y = -32$ is

    (a) 2   (b) 3

    (c) 4   (d) 6

Section B

Fill in the blanks with the correct answer for each of the questions 11 – 20.

11. The value of 21 + 35 (mod 11) is _____ .

12. The value of 23 × 25 (mod 8) is _____ .

13. The value of $5 \otimes_6 (4 \otimes_6 2)$ is _____ .

14. If $2^{3x} = 512$, the value of x that satisfies this equation is _____ .

15. If $a^x = b$, then it can be written in logarithm as _____ .

16. Surds are _____ numbers.

17. The simplified value of the surd $\sqrt{432}$ is_____ .

18. A TV was bought at L\$ 52500. Its value depreciated at a rate of 8% per annum. It new value after two year is _____ .

19. If the value of a quantity depends on two or more other quantities in such a way that a change in one quantity leads to the change in other quantities, then, these quantities are said to be in _____ variation.

20. If y varies inversely as x and y = 8 when x = 3, the value of constant of variation is _____ .

Section C

State whether the following statements are true or false for each of the questions 21 – 30.

21. Modular arithmetic is a system of arithmetic for rational numbers, where numbers wrap around when reaching a certain value, called the modulo. ☐

22. The value of 217 (mod 9) is 1. ☐

23. $a^m \div a^n$ can be written as $a \times a \times a \times ...$ to $(m - n)$ factors. ☐

24. The value of $4^7 \times 4^{-4}$ is 32. ☐

25. The value of $\log_5 225 - \log_5 25$ is 1. ☐

26. The money borrowed or lent is known as the Amount. ☐

27. $\sqrt{225}$ is a surd. ☐

28. If an item depreciates by x%, then, its new value is $(100 - x)$% of the original value. ☐

29. For direct variation, ratio of values of x is equal to ratio of the corresponding values of y. ☐

30. The electrical resistance R Ω of a wire varies directly as the length L cm and inversely as the square root of the diameter d cm, then R is in partial variation with L and d.

Section D

Answer each of the questions 31 – 40.

31. Find the value of expression 5 × 7 × 9 (mod 13).

32. Evaluate the following: $(2 \otimes_5 3) \otimes_5 (4 \otimes_5 3)$

33. Simplify: $\left(\dfrac{125}{64}\right)^{\frac{-2}{3}}$

34. If $4^{-n} = x$, find 2^{2n}

35. Simplify: $4 \log_5 4 - 8 \log_5 2$

36. Simplify: $3\sqrt{2}(3 - 2\sqrt{2}) + 4\sqrt{3}(2 + \sqrt{3})$

37. Simplify: $\sqrt{99} + \dfrac{2}{\sqrt{11}}$

38. Let * be a binary operation defined by $a * b = a^2 + b^2 - 2ab$, where a and b are non-real numbers, then find the value of $\sqrt{3} * \sqrt{12}$.

39. Find the constant of variation for the given data in the table if x and y are in direct variation.

x	2	5.5	9	14.5
y	8	22	36	58

40. If x and y vary inversely and $x = 8$ when $y = 5$, find y when $x = 10$.

Section E

Answer each of the questions 41 – 45.

41. Find the values of x for the equation: 34 = 4 mod x.

42. Simplify the given expression assuming that x is a positive real number and a, b, c are rational numbers:

$$\left(\frac{x^b}{x^c}\right)^a \left(\frac{x^c}{x^a}\right)^b \left(\frac{x^a}{x^b}\right)^c$$

43. Simplify: $\log_9 \dfrac{75}{16} + \log_9 \dfrac{32}{243} - 2\log_9 \dfrac{5}{9}$

44. Daniel deposited a sum of L\$ 75000 at the rate of 4% in the bank on August 5, 2021. On October 17, 2021, he withdrew the sum deposited along with the interest. Find the amount he got.

45. If x varies directly as y^2 and $x = 36$ when $y = 3$, find the value of x when $y = 10$.