SEMESTER-ONE

MATHEMATICS

Class XI

Sample Paper—1

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 (23 × 4) (mod 5) is

(a) 2 (b) 3
(c) 4 (d) None of these

2. If n is a natural number such that 15 (mod n) = 3, the value of n is

(a) 4 (b) 3
(c) 2 (d) None of these

3. The value of x for which $8^x = 0.25$ holds good over the set of integers is

(a) $\frac{-2}{3}$ (b) -2

(c) -3 (d) None of these

4. The law of logarithm $\log_a x - \log_a y = \log_a \frac{x}{y}$ holds good if

(a) $x > 0, y > 0$ (b) $x > 0, y < 0$

(c) $x < 0, y < 0$ (d) $x < 0, y < 0$

5. The value of $3\sqrt{500} - 2\sqrt{125}$, when simplified, is

(a) $2\sqrt{5}$ (b) $4\sqrt{5}$

(c) $10\sqrt{5}$ (d) $20\sqrt{5}$

6. The number $\frac{1}{\sqrt{2}} + \frac{1}{3\sqrt{2}}$ when expressed as a surd is

(a) $\frac{2}{3}\sqrt{2}$ (b) $\frac{1}{3}\sqrt{2}$

(c) $\frac{2}{3}\sqrt{3}$ (d) $\frac{1}{3}\sqrt{3}$

7. If $(2 - x\sqrt{3})(3 + 4\sqrt{3}) = -18 + 2\sqrt{3}$ then, the value of x is

(a) 6 (b) – 6

(c) 2 (d) – 2

8. If a quantity x is directly proportional to y, then

(a) y is directly proportional to x

(b) y is inversely proportional to x

(c) y is jointly proportional to x

(d) None of these

9. If $x \propto \frac{1}{y}$ and $x = 5$ when $y = 4$, then the constant of variation is

(a) 20 (b) 10

(c) 5 (d) None of these

10. A quantity y is partly a constant and partly varies inversely as square of x. If $y = 5$ when $x = 2$, the relationship between x and y is

(a) $y = 3 + \frac{4}{x^2}$ (b) $y = 3 - \frac{4}{x^2}$

(c) $y = 3 + \frac{8}{x^2}$ (d) $y = 3 - \frac{8}{x^2}$

Section B

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

11. The value of 135 (mod 12) is _____ .

12. The value of 8×12 (mod 13) is _____ .

13. The truth set for the equation $3 \oplus_6 n = 0$ is _____ .

14. The index form of 3125 is _____ .

15. Simplified value of $\left(\frac{125}{8}\right)^{-\frac{3}{2}}$ is _____ .

16. A surd of order 2 is called a _____ surd.

17. The value of $(\sqrt{6} + \sqrt{5})(\sqrt{6} - \sqrt{5})$ is _____ .

18. Hassan deposited L$ 27000 in a bank which offers compound interest at the rate of 12% per annum. The amount gets at the end of first year _____ .

19. If two quantities x and y vary with each other in such a manner that the product xy remains constant, then we say that 'x and y vary _____' .

20. If x varies directly as y^2 and $x = 36$ when $y = 3$, 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. The value of expression 12 + 17 (mod 3) is 2. ☐

22. The value of $4 \otimes_5 3$ is 3. ☐

23. $(a^m)^n$ can be written as $a \times a \times a \times \ldots \times a$ ($(m + n)$ factors). ☐

24. The value of $3^6 \div 3^4$ is 9. ☐

25. The value of $\log_{10} 10^2 - \log_5 25^3$ is – 5. ☐

26. The square roots of prime numbers are all surds. ☐

27. The value of $(3+\sqrt{8})(3-\sqrt{8})$ is 1. ☐

28. When interest is calculated yearly, half yearly or quarterly, but not added to the borrowed money, it is known as compound interest. ☐

29. If y varies directly as x it implies as y increases x also increases such that their ratio remains constant. ☐

30. If $y \propto x$ and $y = 8$ when $x = 2$, the value of y is 16 when $x = 3$. ☐

Section D

Answer each of the questions 31 – 40.

31. Find the value of 123 – 77 + 32 (mod 9).

32. Find the values of the following:

(i) $4 \otimes_{12} 9$ (ii) $11 \otimes_{12} 4$

33. Express 2700 as product of powers of prime numbers.

34. Simplify : $\left(\frac{2}{11}\right)^{-3} \times \left(\frac{11}{3}\right)^{-\frac{1}{3}} \times \left(\frac{3}{2}\right)^{-3}$

35. If $\log_2 y = x$, find the value of 8^x in terms of y.

36. Simplify the surd: $\sqrt{\frac{75}{450}}$

37. Evaluate: $7\sqrt{48} - 4\sqrt{27}$

38. Simplify: $(\sqrt{3})^5 \times (\sqrt{75})$

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

x	2	5	9	15
y	6	15	27	45

40. If y varies inversely as the square of x and $y = 100$ when $x = 3$. Find the relation between x and y.

Section E

Answer each of the questions 41 – 45.

41. Let S = {0, 1, 2, 3}. Construct the table for 'addition modulo 4' in S. Using the table, answer the following:

(i) $3 \oplus_4 2 = \ldots$

(ii) Is $(1 \oplus_4 3) + (3 \oplus_4 2) = 1 \oplus_4 0$?

(iii) Find the value of n if $3 \oplus_4 n = 1$

42. Simplify: $\left[\left\{\left(-\frac{1}{2}\right)^{-2}\right\}^{2}\right]^{-2}$

43. Albert deposits L$ 30,000 into a bank account that pays a simple interest rate of 7.5% per annum. For how many years must he invest to generate L$ 45,000?

44. Henry brought a radio for L$ 7500. After one year, its cost depreciates by 25% and he sold it for L$ 6000. Find his profit or loss percent.

45. A train is moving at a uniform speed of 80 km/hour.

(*i*) How far will it travel in 15 minutes?

(*ii*) What time will it take to cover a distance of 260 km?