CHENGALPATTU DISTRICT
SECOND ASSESSMENT TEST - JANUARY - 2022
STANDARD X

STANARD : 10 | **SUBJECT : MATHEMATICS**
TIME : 3 Hours | **MARKS : 100**

PART – I

Note: (i) **Answer all the 14 questions.**
(ii) **Choose the most suitable answer from the given four alternatives and write the option code with the corresponding answer.** **(14 x 1 = 14)**

1) If $n(A \times B) = 6$ and $A = \{1, 3\}$ then, $n(B)$ is
(A) 1 (B) 2 (C) 3 (D) 6

2) If the ordered pairs $(a + 2, 4)$ and $(5, 2a + b)$ are equal then (a, b) is
(A) $(2, -2)$ (B) $(5, 1)$ (C) $(2, 3)$ (D) $(3, -2$

3) If R is a relation from A to , which of the following is correct?
(A) $R = A \cup B$ (B) $R = A \cap B$ (C) $R \subseteq A \times B$ (D) $R \subseteq B \times A$

4) Let $n(A) = p$ and $n(B) = q$ then the total number of relations that can be defined from A to B is
(A) p^q (B) q^p (C) $2^{pq} - 1$ (D) 2^{pq}

5) Using Euclid's division lemma, if the cube of any positive integer is divided by 9 then the possible reminders are
(A) 0, 1, 8 (B) 1, 4, 8 (C) 0, 1, 3 (D) 1, 3, 5

6) If the HCF of 65 and 117 is expressible in the form of $65m - 117$, then the value of m is
(A) 4 (B) 2 (C) 1 (D) 3

7) Given $F_1 = 1, F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is
(A) 3 (B) 5 (C) 8 (D) 11

8) If a, b, c are in A.P, then the value of $\frac{a-b}{b-c} =$
(A) $\frac{a}{b}$ (B) $\frac{b}{c}$ (C) $\frac{a}{c}$ (D) 1

9) The solution of the system $x + y - 3x = -6, -7y + 7z = 7, 3z = 9$ is
(A) $x = 1, y = 2, z = 3$ (B) $x = -1, y = 2, z = 3$
(C) $x = -1, y = -2, z = 3$ (D) $x = 1, y = 2, z = -3$

10) $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ is
(A) $\frac{9y}{7}$ (B) $\frac{9y^3}{(21y-21)}$ (C) $\frac{21y^2-42y+21}{3y^3}$ (D) $\frac{7(y^2-2y+1)}{y^2}$

11) The quotient When $\frac{x^2-25}{x+3}$ divided by $\frac{x+5}{x^2-9}$ is
(A) $(x - 5)(x - 3)$ (B) $(x - 5)(x + 3)$
(C) $(x + 5)(x - 3)$ (D) $(x + 5)(x + 3)$

12) The square root of $\frac{256\,x^8y^4z^{10}}{25\,x^6y^6z^6}$ is equal to
(A) $\frac{16}{5}\left|\frac{x^2z^4}{y^2}\right|$ (B) $16\left|\frac{y^2}{x^2z^4}\right|$ (C) $\frac{16}{5}\left|\frac{y}{xz^2}\right|$ (D) $\frac{16}{5}\left|\frac{xz^2}{y}\right|$

13) The number of points of intersection of the quadratic polynomial $x^2 + 4x + 4$ with the X-axis is
(A) 0 (B) 1 (C) 0 or1 (D) 2

14) The nature of the roots of $x^2 - 25 = 0$ is
(A) no real roots (B) real and equal
(C) real and unequal (D) imaginary roots

PART – II

Note: (i) **Answer only 10 questions.**
(ii) **Question Number 28 is compulsory.** **(10 x 2 = 20)**

15) Let $A = \{1, 2, 3\}$ and $B = \{x / x$ is a prime number lessthan 10 $\}$. Find $A \times B$ and $B \times A$

16) If $A = \{1, 3, 5\}$ and $B = \{2, 3\}$ then (i) find $A \times B$ and $B \times A$ (ii) Is $A \times B = B \times A$? If not why? (iii) Show that $n(A \times B) = n(B \times A) = n(A) \times n(B)$

17) Let $A = \{1, 2, 3, 4, \ldots, 45\}$ and R be the relation defined as "is square number" on A. Write R as a subset of $A \times A$. Also, find the domain and range of .

18) Let $A = \{1, 2, 3, 7\}$ and $= \{3, 0, -1, 7\}$, which of the following are relation from A to B?
(i) $R_1 = \{(2, -1), (7, 7), (1, 3)\}$
(ii) $R_2 = \{(7, -1), (0, 3), (3, 3), (0, 7)\}$

19) A man has 532 flower pots. He wants to arrange them in rows such that each row contains 21 flower pots. Find the number of completed rows and how many flower pots are left

over?

20) Is 7 x 5 x 3 x 2 + 3 a composite number? Justify your answer.

21) If the nth term of the sequence is defined by $a_n = -(n^2 - 4)$ the find a_4 and a_{11}

22) Find the 12^{th} term of an A.P from the last term of $-2, -4, -6, \ldots, -100$

23) Simplify: $\frac{4x^2y}{2z^2} \times \frac{6xz^3}{20y^4}$

24) Which rational expression should be subtracted from $\frac{x^2+6x+8}{x^8+8}$ to get $\frac{3}{x^2-2x+4}$.

25) If $x = \frac{a^2+3a-4}{3a^2-3}$ and $y = \frac{a^2+2a-8}{2a^2-2a-4}$ then find the value of x^2y^{-2}

26) The product of Kumaran's age (in years) two years ago and his age four years from now is one more than twice his present age. What is his present age?

27) If one root of the equation $3x^2 + kx + 81 = 0$ (having real roots) is the square of the other, then find k.

28) Determine the quadratic equation, whose sum and product of roots are $\frac{-3}{2}$ and -1.

PART – III

Note: **(i)** **Answer only 10 questions.**
(ii) **Question Number 42 is compulsory.** **(10 x 5 = 50)**

29) Let $A = \{x \in \mathbb{N} / 1 < x < 4\}$, $B = \{x \in \mathbb{W} / 0 \leq x < 2\}$ and $= \{x \in \mathbb{N} / x < 3\}$. Verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$.

30) Let $A = \{x \in \mathbb{W} / x < 2\}$, $B = \{x \in \mathbb{N} / 1 < x \leq 4\}$ and $C = \{3, 5$. Verify that $(A \cup B) \times C = (A \times C) \cup (B \times C)$.

31) Let $A =$ The set of all natural numbers less than 8, $B =$ The set of all prime numbers less than 8, $C =$ The set of even prime number. Verify that $A \times (B - C) = (A \times B) - (A \times C)$

32) Represent the relation $\{(x, y) / y = x + 3,\ x,\ y$ are all natural numbers less than $< 10\}$
(i) an arrow diagram **(ii)** a graph and **(iii)** a set in roster form.

33) In an A.P, sum of four consecutive terms is 28 and their sum of their squares is 276. Find the four numbers

34) Priya earned Rs.15,000 in the first month. Thereafter her salary increased by Rs.1500 per year. His expenses are Rs.13,000 during the first year and the expenses increases by Rs.900 per year. How long will it take for her to save Rs.20,000 per month?

35) Two A.P.'s have the same common difference. The first term of one A.P. is 2 and that of the other is 7. Show that the difference between their 10^{th} terms is the same as the difference between their 21^{st} terms, which is the same as the difference between any two corresponding terms.

36) **(i)** Find x, y and , given that the numbers $x, 10, y, 24, z$ are in A.P.
(ii) Find the number of terms in the A.P. $3, 6, 9, 12, \ldots, 111$

37) Vani, her father and her grandfather have an average age of 53. One half of her grandfather's age plue one-third of her father's age plus one-fourth of Vani's age is 65. Four years ago if Vani's grandfather was four times as old as Vani then how old are they all now?

38) If the L.C.M of the polynomials $(x^3 + y^3)$ and $(x^4 + x^2y^2 + y^4)$ is $(x^3 + y^3)(x^2 + xy + y^2$ then find the G.C.D.

39) Simplify: $\frac{a^2-16}{a^3-8} \times \frac{2a^2-3a-2}{2a^2+9a+4} \div \frac{3a^2-11a-4}{a^2+2a+4}$

40) Find the square root of : $(6x^2 + x - 1)(3x^2 + 2x - 1)(2x^2 + 3x + 1)$

41) Find the two consecutive positive integers whose sum of the squares is 365.

42) If α and β are the roots of the equation $x^2 + 6x - 4 = 0$ form the quadratic equation whose roots are α^2 and β^2.

PART – IV

Note: **(i)** **This section contains one question with two alternatives.**
(ii) **Answer the given question choosing either of the alternatives.** **(2 x 8 = 16)**

43) Discuss the nature of solutions of the quadratic equation $x^2 + 2x + 5 = 0$.

(OR)

Discuss the nature of solutions of the quadratic equation $(2x - 3)(x + 2) = 0$.

44) Draw the graph of $y = x^2 + 3x - 4$ and hence solve $x^2 + 3x - 4 = 0$

(OR)

Draw the graph of $y = x^2 - 5x - 6$ and hence solve $x^2 - 5x - 14 = 0$