# KENDRIYA VIDYALAYA SITAPUR FIRST SHIFT

Session: 2021-22

TERM – 1 EXAM

CLASS: XI

Mathematics (Code-041)

Time Allowed: 90 minutes | Maximum Marks: 40

General Instructions:

1. This question paper contains three sections – A, B and C. Each part is compulsory.
2. Section - A has 20 MCQs, attempt any 16 out of 20.
3. Section - B has 20 MCQs, attempt any 16 out of 20
4. Section - C has 10 MCQs, attempt any 8 out of 10.
5. There is no negative marking.
6. All questions carry equal marks.

## SECTION-A

In this section, attempt any 16 questions out of Questions 1 – 20.
Each Question is of 1 mark weightage.

1 The distance between the lines 3x + 4y = 9 and 6x + 8y = 15 is

| | |
|---|---|
| A) 6 | B) 3 |
| C) 1/3 | D) 3/10 |

2 If $A = \{x \in N: x \leq 3\}$ $B = \{x \in W: x < 2\}$ then $A \times B =$

| | |
|---|---|
| A) {(0,1), (1,1), (0,2),(1,2), (0,3), (1,3)} | B) {(1,0), (1,1), (2,0),(2,1), (3,0), (3,1)} |
| C) {(1,1), (2,0), (2,1),(3,0), (3,1)} | D) {(1,1), (2,0), (2,1),(3,0), (3,1)} |

3 If the sum of n terms of an A.P. be $3n^2 - n$ and its common difference is 6, then its first term is

| | |
|---|---|
| A)1 | B)2 |
| C)3 | D)4 |

4 For any positive integer n, $(-\sqrt{-1})^{4n+3} = ?$

| | |
|---|---|
| A) 1 | B) $-1$ |

| | | |
|---|---|---|
| | C) $i$ | D) $-\ i$ |
| 5 | Let $A = \{x:\ x \in R,\ x > 4\}$ and $B = \{x:\ x \in R,\ x < 5\}$. Then $A \cap B$ = | |
| | A) (4,5) | B) [4,5] |
| | C) [4,5) | D) (4,5] |
| 6 | Let R be the relation on a finite set having n elements, then the number of relations on A is | |
| | A) $2^n$ | B) $2^{n^2}$ |
| | C) $n^2$ | D) $n^n$ |
| 7 | $\frac{\sin sin\, ax}{bx}$ is | |
| | A)1 | B) 0 |
| | C) $\frac{a}{b}$ | D) $\frac{b}{a}$ |
| 8 | The first and last terms of an A.P. are 1 and 11. If the sum of its terms is 36 , then the number of terms will be | |
| | A)5 | B)6 |
| | C)7 | D)8 |
| 9 | $\frac{x^4-4}{x^2+3\sqrt{2}x-8}$ is | |
| | A) 5/8 | B) 8/5 |
| | C) 4/5 | D) 5/4 |

10 The equation of the line passing through (1, 2) and perpendicular to x + y + 7 = 0 is

| | |
|---|---|
| A) y – x + 1 = 0 | B) y – x – 1 = 0 |
| C) y – x + 2 = 0 | D) y – x – 2 = 0 |

11 If $(a + ib) = \sqrt{\frac{1+i}{1-i}}$ then the value of $a^2 + b^2$ is

| | |
|---|---|
| A) 1 | B) -1 |
| C) 2 | D) -2 |

12 The sum of 10 items is 12 and the sum of their squares is 18. The standard deviation is

| | |
|---|---|
| A) 1/5 | B) 2/5 |
| C) 3/5 | D) 4/5 |

13 $\frac{(1+x)^3-1}{x}$ is

| | |
|---|---|
| A) 0 | B) 1 |
| C) 2 | D) 3 |

14 For a given data, the variance is 15. If each observation is multiplied by 2, what is the new variance of the resulting observations?

| | |
|---|---|
| A) 15 | B) 60 |
| C) 30 | D) 7.5 |

15 The ratio between the sums of n terms of two arithmetic progressions is (7n + 1) : (4n + 27).The ratio of their 11th terms is

| | |
|---|---|
| A) 136 : 117 | B) 124 : 105 |
| C) 148 : 111 | D) 78 : 71 |

| | |
|---|---|
| 16 | The multiplicative inverse of (−2 + 5i ) is |

| | |
|---|---|
| A)$(-\frac{2}{29}+i\frac{5}{29})$ | B) $(\frac{2}{29}-i\frac{5}{29})$ |
| C) $(\frac{2}{29}+i\frac{5}{29})$ | D) $(-\frac{2}{29}-i\frac{5}{29})$ |

| | |
|---|---|
| 17 | The angle between the lines x + 2y = 3 and y - 2x = 5 is |

| | |
|---|---|
| A) $45^0$ | B) $60^0$ |
| C) $90^0$ | D) $0^0$ |

| | |
|---|---|
| 18 | The solution set of $x^2 + 2 = 0$ is |

| | |
|---|---|
| A) $\{\sqrt{2}, -\sqrt{2}\}$ | B) $\{\sqrt{2}i, -\sqrt{2}\}$ |
| C) $\{\sqrt{2}, -\sqrt{2}i\}$ | D) $\{\sqrt{2}i, -\sqrt{2}i\}$ |

| | |
|---|---|
| 19 | Slope of a line which cuts off intercepts of equal lengths on the axes is |

| | |
|---|---|
| A) -1 | B) 2 |
| C) 0 | D) √3 |

| | |
|---|---|
| 20 | If (k −1), (2k + 1), (6k + 3) are in GP then k = ? |

| | |
|---|---|
| A) 7 | B) 4 |
| C) -2 | D) 0 |

SECTION – B

In this section, attempt any 16 questions out of the Questions 21 - 40.

Each Question is of 1 mark weightage.

| | |
|---|---|
| 21 | Find n if $\frac{x^n-2^n}{x-2} = 80,\ n\in N$ |

| | |
|---|---|
| A) 2 | B) 160 |

| | | |
|---|---|---|
| | C) 40 | D) 5 |

| | |
|---|---|
| 22 | The coordinates of the foot of the perpendicular from the point (2, 3) on the line $x + y - 11 = 0$ are |

| | |
|---|---|
| A) (-6, 5) | B) (5, 6) |
| C) (-5, 6) | D) (6, 5) |

| | |
|---|---|
| 23 | Let S = {x ⏐ x is a positive multiple of 3 less than 100}<br><br>P = {x ⏐ x is a prime number less than 20}. Then n(S) + n(P) is |

| | |
|---|---|
| A) 40 | B) 41 |
| C) 43 | D) 34 |

| | |
|---|---|
| 24 | If $f(z) = \frac{7-z}{1-z^2}$ where $z = 1 + 2i$, then $\lvert f(z)\rvert$ is |

| | |
|---|---|
| A) $\frac{\lvert z\rvert}{2}$ | B) $\lvert z\rvert$ |
| C) $2\lvert z\rvert$ | D) none of these |

| | |
|---|---|
| 25 | The equation of the line, which makes intercepts –3 and 2 on the x- and y-axes respectively is |

| | |
|---|---|
| A) 2x + 3y + 6 = 0 | B) 2x + 3y - 6 = 0 |
| C) 2x + 3y - 6 = 0 | D) 2x - 3y + 6 = 0 |

| | |
|---|---|
| 26 | The mean deviation about the mean for the following data 3, 7, 8, 9, 4, 6, 8, 13, 12, 10 is |

| | |
|---|---|
| A) 5 | B) 3 |
| C) 2 | D) 2.4 |

27 The solution set of $x^2 + 2x + 2 = 0$ is

| | |
|---|---|
| A) $\{i, -i\}$ | B) $\{1 + i, -i\}$ |
| C) $\{1 + i, 1 - i\}$ | D) $\{-1 + i, -1 - i\}$ |

28 Let $S_n$ denote the sum of first n terms of an AP. If $S_{2n}$=3 $S_n$ then $S_{3n}$:$S_n$ is equal to

| | |
|---|---|
| A) 4 | B) 8 |
| C) 6 | D) 10 |

29 The equation of the line through the points (1, –1) and (3, 5) is

| | |
|---|---|
| A) 3x + y + 4 = 0 | B) – 3x + y + 4 = 0 |
| C) 3x – y + 4 =0 | D) none of these |

30 The domain and range of the function f given by $f(x) = 2 - |x - 5|$ is

| | |
|---|---|
| A) Domain = $R^+$, Range = ( – ∞, 1] | B) Domain = R, Range = ( – ∞, 2] |
| C) Domain = R, Range = (– ∞, 2) | D) Domain = R+, Range = (– ∞, 2] |

31 If the variance of the data is 121 then the standard deviation of the data is

| | |
|---|---|
| A) 121 | B) 11 |
| C) 12 | D) 21 |

32 If x, 2y, 3z are in A.P., where the distinct numbers x, y, z are in G.P. then the common ratio of the G.P. is

| | |
|---|---|
| A) 3 | B) 1/3 |
| C) 2 | D) 1/2 |

33 The number of elements in P[P(P(φ))] is

| | | |
|---|---|---|
| | A) 2 | B) 3 |
| | C) 4 | D) 5 |
| 34 | Let A = {1, 2, 3, 4}, B = {1, 5, 9, 11, 15, 16} and f = {(1, 5), (2, 9), (3, 1), (4, 5), (2, 11)}. Then | |
| | A) f is a relation from A to B | B) f is a function from A to B |
| | C) Both (a) and (b) | D) None of these |
| 35 | The mean weight of a group of 10 items is 28 and that of another group of n items is 35.The mean of combined group of 10 + n items is found to be 30. The value of n is | |
| | A) 12 | B) 10 |
| | C) 4 | D) 2 |
| 36 | The value of x for which the points (x, – 1), (2,1) and (4, 5) are collinear is | |
| | A) 0 | B) -1 |
| | C) 1 | D) none of these |
| 37 | The standard deviation of the data 6, 5, 9, 13, 12, 8, 10 is | |
| | A) $\sqrt{\frac{52}{7}}$ | B) $\frac{52}{7}$ |
| | C) $\sqrt{6}$ | D) 6 |
| 38 | If A and B are finite sets such that A $\subset$ B, then | |
| | A) $n(A \cup B) = n(A)$ | B) $n(A \cap B) = n(B)$ |
| | C) $n(A \cup B) = n(B)$ | D) None of these |

39 $\left(\sqrt{x^2 + x + 1} - \sqrt{x^2 + 1}\right)$ is

| | |
|---|---|
| A) $-\frac{1}{2}$ | B) $-\frac{1}{3}$ |
| C) $-\frac{1}{4}$ | D) $\frac{1}{2}$ |

40 If $z = 2 - 3i$, then the value of $z^2 - 4z + 13$ is

| | |
|---|---|
| A) 1 | B) -1 |
| C) 0 | D) none of these |

SECTION – C

In this section, attempt any 8 questions.

Each question is of 1-mark weightage.

Questions 47-50 are based on a Case-Study.

41 Two finite sets have m and n elements. The number of subsets of first set is 112 more than that of the second set. The values of m and n are respectively

A) 4 and 7 B) 7 and 4

C) 4 and 4 D) 7 and 7

42 If $f(x) = \frac{x(x-p)}{q-p} + \frac{x(x-q)}{p-q}$, $p \neq q$. What is the value of $f(p) + f(q)$ ?

(A) f (p – q) (B) f (p + q)

(C) f (p (p + q)) (D) f (q (p – q))

43 $\left(\frac{1}{1-2i} + \frac{3}{1+i}\right)\left(\frac{3+4i}{2-4i}\right)$ is equal to

A) $\frac{1}{2} + i\frac{9}{2}$ B) $\frac{1}{2} - i\frac{9}{2}$

C) $\frac{1}{4} + i\frac{9}{4}$ D) $\frac{1}{4} - i\frac{9}{4}$

44 If the sum of first p terms of an A.P. is equal to the sum of the first q terms then the sum of the first (p + q) terms, is

(A) 0 (B) 1

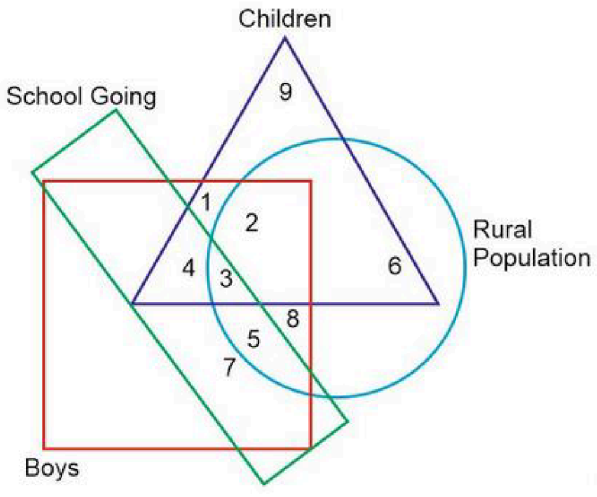
| | |
|---|---|
| | (C) 2 (D) 3 |
| 45 | The difference between any two consecutive interior angles of a polygon is 5°. If the smallest angle is 120°. The number of the sides of the polygon is<br>(A) 6 (B) 9<br>(C) 8 (D) 5 |
| 46 | In a survey of 25 students, it was found that 12 have taken physics, 11 have taken chemistry and 15 have taken mathematics; 4 have taken physics and chemistry; 9 have taken physics and mathematics; 5 have taken chemistry and mathematics while 3 have taken all the three subjects. The number of students who have taken at least one of the three subjects is<br>A) 25 B) 23<br>C) 24 D) 21 |

**CASE STUDY**

Venn Diagrams

Venn diagrams were invented by a logician John Venn as a way of picturing relationships between different groups of things. These diagrams, also called Set diagrams or Logic diagrams, are widely used in mathematics, statistics, logic, teaching, linguistics, computer science and business.

In the following diagram, triangle shows children, circle shows rural population, rectangle shows school going population & square shows boys.



Based on the given information, answer the following questions.

| | |
|---|---|
| 47 | The village boys not going to school are denoted by which number?<br>A) 1 B) 2 C) 1,2 D) 2,8 |
| 48 | The village children not going to school are denoted by which number?<br>A) 1 B) 2 C) 6 D) 2,6 |
| 49 | What is represented by number 4?<br>A) School going boys B) Children who are not from village.<br>C) Children who are boys D) School going boys who are not from village. |
| 50 | School going boys from village are denoted by which number?<br>A) 3 B) 3,5 C) 3,4 D) 3, 4, 5,7 |