Name: Akshat Singh
Class: IX – D
Subject: Mathematics
Date: 9/9/24
Invigilator's Sign.
Session: 2024-25

Roll No. 0 1

SET – A
SUBJECT CODE-041

Time allowed: 3 Hours

Maximum Marks: 80

NOTE :

- **Please check that this question paper contains 6 printed pages.**
- **Question paper code given on the right-hand side of the question paper should be written on the title page of the answer book by the candidate.**
- **Please check that this question paper contains 38 questions.**
- **Please write down the serial number of the question in the answer-book before attempting it.**
- **15 minutes time has been allotted to read this question paper. The students will read the question paper only and will not write any answer on the answer-book during this period.**

General Instructions:
Read the following instructions very carefully and follow them:

(i) This question paper contains 38 questions. All questions are compulsory.
(ii) Question paper is divided into **FIVE** sections- **A, B, C, D and E**.
(iii) In **Section A**- Question Number **1 to 20** are Multiple Choice Questions (MCQ) - type of 1 mark each.
(iv) In **Section B**- Question Number **21 to 25** are Very Short Answer (VSA)-type questions of 2 marks each.
(v) In **Section C**- Question Number **26 to 31** are Short Answer (SA)-type questions of 3 marks each.
(vi) In **Section D**- Question Number **32 to 35** are Long Answer (LA)- type questions of 5 marks each.
(vii) In **Section E**- Question Number **36 to 38** are case study-based questions carrying 4 marks each. However, an internal choice in 2Qs of 5marks, 2Qs of 3marks and 2Qs of 2marks has been provided. An internal choice has been provided in the 2marks questions of Section E.
(viii) Draw neat figure wherever required Take. $\pi = \frac{22}{7}$ wherever required.
(ix) Use of calculator is not allowed.

SECTION A

Marks

1. A number is irrational if and only if its decimal representation is **1**
   (a) non-terminating
   (b) non-terminating and repeating
   • (c) non-terminating and non-repeating
   (d) terminating

2. If $8^{x+1} = 64$, then the value of 3^{2x+1} is : **1**
   (a) 1 (b) 3 • (c) 9 (d) 27

3. The rationalising factor of $\frac{1}{\sqrt{9}-\sqrt{7}}$ is : **1**
   (a) $\sqrt{9}+7$ • (b) $9+\sqrt{7}$ (c) $3+\sqrt{7}$ (d) $3-\sqrt{7}$

4. The value of $\sqrt{3-2\sqrt{2}}$ is : **1**
   (a) $\sqrt{2}-1$ (b) $\sqrt{2}+1$ • (c) $\sqrt{3}-\sqrt{2}$ (d) $\sqrt{3}+\sqrt{2}$

5. If $a^{\frac{1}{3}} + b^{\frac{1}{3}} + c^{\frac{1}{3}} = 0$, then 1
(a) $a + b + c = 0$ (b) $(a + b + c)^3 = 27abc$
(c) $a + b + c = 3abc$ (d) $a^3 + b^3 + c^3 = 0$

6. If $x + y = 2$ and $xy = 1$, then the value of $x^4 + y^4$ is: 1
(a) 6 (b) 4 (c) 8 (d) 2

7. If $x^2 + kx + 6 = (x + 2)(x + 3)$ for all x, then the value of k is : 1
(a) 1 (b) -1 (c) 5 (d) 3

8. The zero of the polynomial $p(x) = cx + d$ is : 1
(a) c (b) $-d$ (c) $\frac{-d}{c}$ (d) $\frac{d}{c}$

9. If the point (3, 4) lies on the graph of the equation $3y = kx + 7$. The value of k is: 1
(a) $\frac{4}{3}$ (b) $\frac{5}{3}$ (c) 3 (d) $\frac{7}{3}$

10. The graph of the linear equation $4x - 3y - 12 = 0$ cuts $x - axis$ at point 1
(a) (3, 0) (b) $(-3, 0)$ (c) (4, 0) (d) $(-4, 0)$

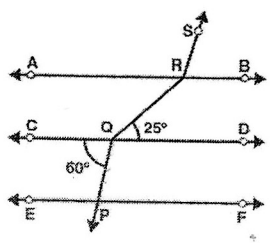
11. If the image of a point P under reflection on the $x - axis$ has the coordinates $(7, -3)$, then the coordinate of point P is : 1
(a) (7, 3) (b) $(-7, 3)$ (c) $(-7, -3)$ (d) $(-3, 7)$

12. The distance of the point A$(-8, 5)$ from the $y - axis$ is : 1
(a) 8 units (b) 5 units (c) 13 units (d) 3 units

13. If two interior angles on the same side of a transversal intersecting two parallel lines are in the ratio 2 : 3, then the greater of the two angles is: 1
(a) 54° (b) 108° (c) 120° (d) 36°

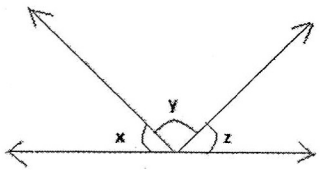
14. The area of an equilateral triangle having side $\frac{\sqrt{3}}{4}$ cm is: 1
(a) $\frac{2}{27}cm^2$ (b) $\frac{2}{15}cm^2$ (c) $\frac{3\sqrt{3}}{64}cm^2$ (d) $\frac{3\sqrt{3}}{16}cm^2$

15. In the given figure, if AB || CD || EF, PQ || RS, $\angle RQD = 25°$ and $\angle CQP = 60°$, then $\angle QRS$ is equal to 1



(a) 85° (b) 110° (c) 135° (d) 145°

16. In the given figure if $\frac{y}{x} = 5$ and $\frac{z}{x} = 4$, then the value of x is : 1



(a) 8° (b) 18° (c)12° (d) 15°

17. In a scalene triangle, one side exceeds the other two sides by 4 *cm* and 5*cm* respectively and the perimeter of the triangle is 36 *cm*. The area of the triangle is : 1

(a) 63 cm^2 (b) $9\sqrt{10}\,cm^2$ (c)$18\sqrt{10}cm^2$ (d)$12\sqrt{21}cm^2$

18. If $x°$ is the measure of an angle which is equal to its complement and $y°$ is the measure of an angle which is equal to its supplement, then $\frac{x°}{y°}$ is equal to : 1

(a) 2 (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) $\frac{1}{4}$

Directions:
In question No. 19 and 20 a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.
(a)Both, Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of Assertion (A).
(b)Both, Assertion (A) and Reason (R) are true but Reason (R) is not correct explanation of Assertion (A).
(c) Assertion (A) is true but Reason (R) is false.
(d) Assertion (A) is false but Reason (R) is true

19. **Assertion (A):** The graph of the linear equation $4x + 3y = 24$ meets *x-axis* at $(-6, 0)$. 1
Reason (R): Points on *x-axis* are of the form (a, 0), where a is a variable.

20. **Assertion (A):** The height of an equilateral triangle is $\frac{\sqrt{3}}{2}$ times its side. 1
Reason (R): If the side of an equilateral triangle is 6 *cm*, then the height is 9 *cm*.

SECTION B

21. Solve the equation : $3(2^x + 1) - 2^{x+2} + 5 = 0$. 2

22. (A) Factorise : $1 - 2ab - (a^2 + b^2)$ 2

OR

(B) If $a + b = 7$ and $ab = 6$ then find the value of $a^3 + b^3$. 2

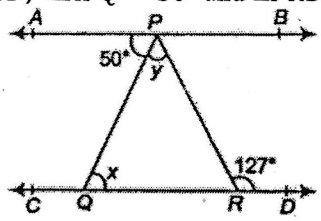
23. The hypotenuse of an isosceles right triangle is 10 cm. Find its area. 2

24. If the points A(3, 5) and B(1, 4) lie on the graph of the line $ax + by = 7$, then find the values of a and b. 2

25. (A) If the complement of an angle is equal to the supplement of thrice of it, then find the measure of the angle. 2

OR

(B) In the given figure, if $AB \parallel CD$, $\angle APQ = 50°$ and $\angle PRD = 127°$, find x and y. 2



SECTION C

26. Write the coordinates and in which quadrant the points lie. 3

(i) the ordinate is 5 and abscissa is – 3

(ii) the abscissa is – 5 and ordinate is – 3

(iii) the abscissa is – 5 and ordinate is 3

27. If $\sqrt{m} + \sqrt{n} - \sqrt{p} = 0$, then find the value of $(m + n - p)^2$. 3

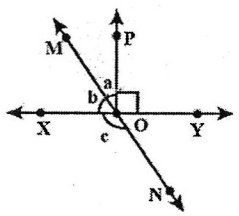
28. (A) If $\frac{4+3\sqrt{5}}{4-3\sqrt{5}} = a + b\sqrt{5}$, then find the value of a and b. 3

OR

(B) Prove that : $\frac{1}{1+x^{b-a}+x^{c-a}} + \frac{1}{1+x^{a-b}+x^{c-b}} + \frac{1}{1+x^{a-c}+x^{b-c}} = 1$. 3

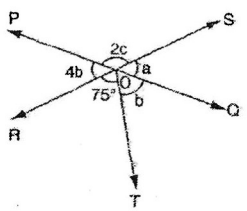
29. The perimeter of an isosceles triangle is 32 cm. The ratio of the equal side to its base is 3: 2. Find the area of the triangle 3

30. (A) In the Figure, lines XY and MN intersect at O. If $\angle POY = 90°$ and a : b = 2 : 3, find c. 3



OR

(B) In the figure two straight lines PQ and RS intersects each other at O. If $\angle ROT = 75°$, then find the values of a, b and c. 3



31. If $x = k^2$ and $y = k$ is a solution of the equation $x - 5y + 6 = 0$, then find the values of k. 3

SECTION D

32. (A) If $x = 9 + 4\sqrt{5}$, find the value of $\sqrt{x} - \frac{1}{\sqrt{x}}$. 5

OR

(B) If $x = \frac{2-\sqrt{5}}{2+\sqrt{5}}$ and $y = \frac{2+\sqrt{5}}{2-\sqrt{5}}$, find the value of $x^2 - y^2$. 5

33. (A) If both $(x - 2)$ and $(x - \frac{1}{2})$ are factors of $px^2 + 5x + r$, then show that $p = r$. 5

OR

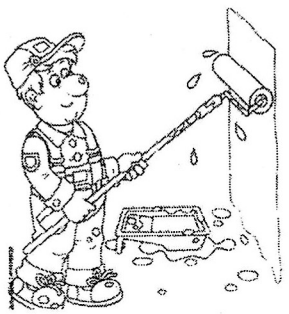
(B) Prove that: $(a + b + c)^3 - a^3 - b^3 - c^3 = 3(a + b)(b + c)(c + a)$. 5

34. POQ is a line. Ray OR is perpendicular to line PQ. OS is another ray lying between rays OP and OR. Prove that $\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$. 5

35. From a point in the interior of an equilateral triangle, perpendicular are drawn on the three sides. The lengths of the perpendicular are $12cm$, $14cm$, and $8cm$. Find the area of the triangle 5

SECTION E
Case Study Based Questions

36. Mahesh wants to paint a wall of his room. He decided to paint the wall in two colors, pink and white, divided diagonally. The length and breadth of the wall are $(x + 4)$ and $(3x + 2)$ respectively. The diagonal of the wall is $(x^2 + 3x)$. Answer the following questions based on this.



(i) Mahesh wished to draw flowers in the squared area of the wall. By how much length should be reduced ? 1

(ii) What is the area of the wall ? 1

(iii) (a) Find the square of the diagonal and what is the degree of the polynomial. 2

OR

(b) If $x = 2$, then find the area to be painted pink. 2

37. While selling clothes for making flags, a shopkeeper claims to sell each piece of cloth in the shape of an equilateral triangle of each side 10 cm while actually he was selling the shape in the shape of isosceles triangle with sides 10 cm, 10 cm and 8 cm. Answer the following questions.

(i) Find the area of an equilateral triangular flag. 1

(ii) If the shopkeeper sells 500 equilateral triangular flags, then find its area. 1

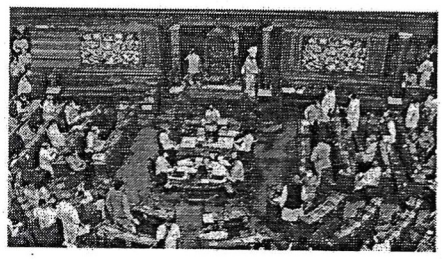
(iii) (a) Find the area of an isosceles triangular flag by using herons formula. 2

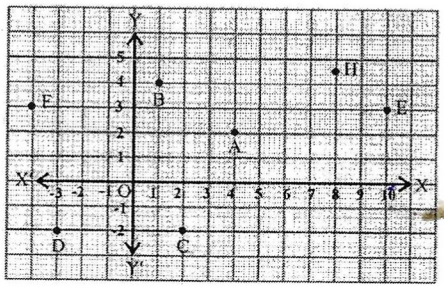
OR

(b) How much cloth was he saving in selling each flag ? (use $\sqrt{3} = 1.73$ and $\sqrt{21} = 4.56$) 2

38. Student of class IX are on visit of Sansad Bhawan. Teacher assign them the activity to observe and take some pictures to analyses the seating arrangement between various MP and speaker based on coordinate geometry. The staff tour guide explained various facts related to the Mathematics of Sansad Bhawan to the students. Students were surprised when the teacher ask them you need to apply coordinate geometry on the seating arrangement of MP's and speaker.

Refer the image below and graph to answer the following questions:





(i) What are the coordinates of position 'F'? 1

(ii) In which quadrant, the point 'C' lie? 1

(iii) (a) Write the coordinates of point E and find the perpendicular distance of the point 'E' from the *y-axis*. 2

OR

(b) Write the coordinates of the mirror image of point 'H' in $x - axis$ and point 'F' in $y - axis$. 2