SAMPLE PAPER

FINAL EXAM   SESSION 2022 – 23
CLASS – IX

TIME: 3 HRS   **SUBJECT : MATHS**   **M.M = 80**

General instructions.

(a) This question paper contains Four Sections A , B and C .

(b) SECTION -A contains 16 objective type question . 1 mark each .

(c) SECTION – B contains 2 case studies . Each comprises of 5 case based MCQs . Examinee has to attempt any four . 1 mark each .

(d) SECTION C has **3 parts** contains 20 questions

PART A - Questions 19 to 28 of 2 marks .(20 marks)

PART B - Questions 29 to 35 of 3 marks . (21 marks)

PART C - Questions 36 to 38 of 5 marks .   (15 marks)

SECTION – A

1. The set $A = \{x \in R \mid 0 < x < 1\}$ is
  (a) finite set   (b) infinite set
  (c) singleton set   (d) null set

Or

If $A \subset B$ then
  (a) $a \in A \Rightarrow a \notin B$ (b) $a \in A \Rightarrow a \in B$
  (c) $a \notin A \Rightarrow a \in B$ (d) $a \in B \Rightarrow a \in A$

2. If $f : R \to R$, given by $f(x) = x^2 + 3$, then find the pre image of 2 under f.
  (a) 7   (b) 5   (c) –1   (d) does not exist

3. $150°$ is terms of radians is
  (a) $\dfrac{\pi^c}{2}$ (b) $\dfrac{2\pi^c}{3}$ (c) $\dfrac{7\pi^c}{4}$ (d) $\dfrac{5\pi^c}{6}$

4. Write the set $A = \{1, 4, 9, 16, 25 ....\}$ in set builder form.

Or

Write the set of letters of the word 'FOLLOW' in roster form.

5. Evaluate $\cos\left(\dfrac{\pi}{4} - x\right)\cos\left(\dfrac{\pi}{4} - y\right)$
$$- \sin\left(\dfrac{\pi}{4} - x\right)\sin\left(\dfrac{\pi}{4} - y\right).$$

Or

Prove that $\sqrt{2}\,\sin\left(\dfrac{\pi}{4} - x\right) = \cos x - \sin x.$

6. $(3 + 4i)^2 = a - bi$, then
  (a) $a = 25, b = 24$ (b) $a = -16, b = 24$
  (c) $a = -7, b = -24$ (d) $a = -7, b = 24$

7. Represent $\dfrac{5}{i^{33}}$ in standard form.

8. The 10th term in the expansion of $\left(2x^2 - \dfrac{1}{x}\right)^{12}$ is
  (a) $-1760x^{-3}$ (b) $1760x^3$ (c) $-1760x^3$ (d) $1760x^{-3}$

9. In how many ways can 12 boys sit in a row, for the examination?

10. Given a sequence $\{a_n\}$ such that $a_1 = 2$, $a_n = 3a_{n-1} - 2$, $n > 1$ then a_3 is
  (a) 4   (b) 10   (c) 8   (d) 12

11. Insert 3 arithmetic means between 2 and 10.

12. Find the value of x, for which points $(x, -1)$, $(2, 1)$ and $(4, 5)$ are collinear.
  (a) 0   (b) 1   (c) 3   (d) 2

13. The point on the y-axis at a distance of $\sqrt{10}$ units from the point $(1, 2, 3)$ is
  (a) $(0, 2, 0)$ (b) $(2, 0, 0)$ (c) $(0, 0, 2)$ (d) $(0, 1, 0)$

14. Find the length of latus rectum for the parabola $y^2 = -12x.$

15. Find the length of transverse axis for the hyperbola
$$\dfrac{y^2}{9} - \dfrac{x^2}{16} = 1$$

Or

Find the length of major axis of the ellipse $\dfrac{y^2}{9} + \dfrac{x^2}{16} = 1.$

16. A bag contains 5 green and 7 red balls, two balls are drawn at random. Find the probability that one is green and the other is red

Or

How many elements, a sure event of an experiment contains?

SECTION – B

17. CASE STUDY 1
  Read the questions carefully and answer any four.
  (a) Eccentricity of a parabola is _____.
      (i) less than one   (ii) more than one   (iii) equal to one   (iv) none of these
  (b) The length of latus rectum of the ellipse $3x^2 + y^2 = 12$ is _____.
      (i) 4   (ii) 3   (iii) 8   (iv) $4 / \sqrt{3}$
  (c) Foci of the ellipse $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$ is _____.
      (i) (ae , 0)   (ii) (- ae , 0)   (iii) (0 , ± ae)   (iv) (0 , - a)
  (d) Centre of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is _____.
      (i) (g , -f)   (ii) (- g , f)   (iii) (- g , - f)   (iv) (- g , 0)
  (e) If point (- 2 , 3) lies on the curve $y^2 = - 4ax$, then the value of a is _____.
      (i) $\frac{8}{9}$ (ii)$\frac{9}{8}$ (iii)$\frac{3}{8}$ (iv) none of these

CASE STUDY 2

18. Read the questions carefully and answer any four questions.
  (a) How far does the tip of the clock moves in 40 minutes if the minute hand of clock is 1.5 m long.
      (i) 4.28   (ii) 6.28   (iii) 3.67   (iv) none of these
  (b) The value of cot (-15 π / 4) is _____.
      (i) 1   (ii) -1   (iii) 2   (iv) none of these
  (c) Point (6 , 2 , -3) lies in the_____.
      (i) octant II   (ii) octant III   (iii) octant IV   (iv) octant V
  (d) Angle between hour hand and minute hand of the clock when the time is 7:20 is _____.
      (i) 110°   (ii) 120°   (iii) 210°   (iv) none of these
  (e) The value of sin 18° is _____.
      (i) $\sqrt{5} – 1 / 2$ (ii) $\sqrt{5} – 1 / 4$ (iii) $\sqrt{5} + 1 / 4$ (iv) none of these

SECTION – C
(PART – I)

19. Let R be a relation on set N of natural numbers defined by R = { (a , b) : a + 3b = 12 , a , b € N }. Find the domain and range.

20. Find the centre and the radius of the circle $2x^2 + 2y^2 - x = 0$.

21. If $\text{Lim } x \rightarrow a \ \frac{x^9 - a^9}{x - a} = 9$, find all possible values of a .

22. A horse is tied to a post by a ropes. If the horse moves along a circular path, always keeping the rope tight and describes 88 metres when it traces 72° at the centre, find the length of the rope.

23. If A + B = 45°, then find the value of (1 + tan A) (1 + tan B).

24. Find the domain and range of f(x) = | x – 3 |

25. Solve $|3x – 2| \le \frac{1}{2}$

OR

Prove that $\frac{\cos \ 9° + \sin \ 9°}{\cos \ 9° - \sin \ 9°} = tan \ 54°$

26. Find the number of possible arrangements of the letters of the word MALENKOVso that the vowels don't come together.

27. Find the equation of the parabola with vertex (0 , 0), passing through (2 , 3) and axis is along the X – axis.

28. Differentiate : $\dfrac{2x^2 + 3x + 4}{x}$, w. r. t x .

29. Prove that $\cos\left(\dfrac{3\pi}{4} + x\right) - \cos\left(\dfrac{3\pi}{4} - x\right) = -\sqrt{2}\sin x$

OR

Find the derivative of cos x from the first principle.

30. Solve the inequality
$\dfrac{x}{2} < \dfrac{5x - 2}{3} - \dfrac{7x - 3}{5}$ and show the graph of the solution on the number line .

31. Using the section formula, show that the points (2 , - 3 , 4), (-1 , 2 , 1) and (0 , 1 / 3 , 2) are collinear.

32. Prove that sin 10° sin 30 ° sin 50° sin 70° = 1 / 16

33. Find the equation for the ellipse that satisfies given conditions : major axis along x – axis and passes through (4 , 3) and (6 , 2).

34. Evaluate Lt x→0 f (x) , where $f (x) = \dfrac{x}{|x|}$, $x \ne 0$
0 , $x = 0$

35. Find the mean deviation about the median for the given data.

X_i	15	21	27	30	35
F_i	3	5	6	7	8

36. Angle α is divided into two parts such that the ratio of the tangents of the parts is k : 1, if x is the difference between two parts then prove that **sin x** = $\dfrac{k - 1}{k + 1}$ **sin** α.

37. If sin y = x sin (a + y), then prove that $\dfrac{dy}{dx} = \dfrac{\sin^2 (a + y)}{\sin a}$.

OR

(a) Solve graphically : 2 x + y ≥ 8 , x + 2y ≥ 10
(b) Find the value of 'n ' **such that $2nC_1$, $2nC_2$ $2nC_3$ are in A.P.**

38. Find the equation of the circle passing through the points (2 , 3) and (- 1 , 1) and whose centre is on the line x – 3y – 11 = 0.