ICSE 2023 EXAMINATION,

FINAL PRACTICE PAPER-1

MATHEMATICS

Time: Two and half hours   **Maximum Marks: 80**

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Answer to this Paper must be written on the paper provided separately.
You will not be allowed to write during first 15 minutes.
This time is to be spent in reading the question paper.
The time given at the head of this Paper is time allowed for writing the answers.

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Attempt all questions form Section A and any four questions from Section B.
All working including rough work, must be clearly shown, and must be done on the same sheet
as the rest of the answer.
Omission of essential working will result in loss of marks.
The indented marks for questions or parts question are given in brackets [ ].
Mathematical tables are provided.

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Section A

*(Attempt **all** questions from this Section)*

Question: 1

Choose the correct answers to the questions from the given options.   [15]

(i)   If the cost of an article is ₹25,000and CGST paid by the owner is ₹2250, the rate of GST is

(a) 9%   (b) 10%

(c) 15%   (d) 18%

(ii)   The quadratic equation $3\,x^2 - 4\sqrt{3}\,x + 4 = 0$ has:

(a) two distinct real roots   (b) two equal real roots

(c) no real roots   (d) two imaginary roots

(iii) The roots of quadratic equation $mx^2 - 7mx + 49 = 0$ are equal; the value of m is:

(a) 4   (b) 2

(c) ± 4 (d) ± 2

(iv)   If matrix A is of order 3×2 and matrix B is of order 2×2 then the matrix AB is of order

(a) 3×2 (b) 2×2

(c) 3×3 (d) 2×3

(v)   If 73 is the nth term of the arithmetic progression 3, 8, 13, 18…, then 'n' is

(a) 13   (b) 14

(c) 15   (d) 16

**(vi)** What is the image of the point $(3, -4)$ under reflection in the x-axis?

    (a) $(-3, 4)$ (b) $(3, 4)$

    (c) $(3, -4)$ (d) $(-3, -4)$

(vii) In the given figure, value of x (in cm) is:
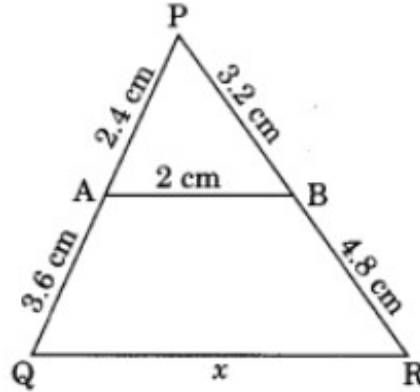
    (a) 4   (b) 5

    (c) 6   (d) 8

(viii) The ratio of the volumes of two spheres is $8 : 27$. If r and R are the radii of spheres respectively, then r : R is

    (a) $1 : 2$ (b) $1 : 3$

    (c) $2 : 3$ (d) $4 : 9$

(ix) The solution set for the given inequation $-8 \leq 2x < 8, x \in W$:

    (a) $\{-4, -3, -2, -1, 0, 1, 2, 3, 4\}$ (b) $\{0, 1, 2, 3, 4\}$

    (c) $\{0, 1, 2, 3\}$ (d) $\{0, 1, 2, 3, 4, 5, 6, 7\}$

(x) A bag contains 4 red marbles, 3 blue marbles, and 2 green marbles. If one marble is drawn at random, what is the probability that it is not red?

    (a) $\frac{1}{9}$ (b) $\frac{2}{9}$

    (c) $\frac{5}{9}$ (d) $\frac{7}{9}$

(xi) If $\begin{bmatrix} 2 & x \\ 0 & 1 \end{bmatrix} + 3 \begin{bmatrix} 2 & 1 \\ 4 & 0 \end{bmatrix} = \begin{bmatrix} 8 & 8 \\ 12 & 1 \end{bmatrix}$. The value of x is:

    (a) 2   (b) 3

    (c) 4   (d) 5

(xii) What are the coordinates of the point that is 3 units to the left and 2 units above the point $(2, -5)$?

    (a) $(-1, -7)$ (b) $(-1, -3)$

    (c) $(5, -7)$ (d) $(5, -3)$

(xiii) In the given figure, AB is a diameter of the circle with centre 'O'. If $\angle COB = 55^\circ$ then the value of x is:
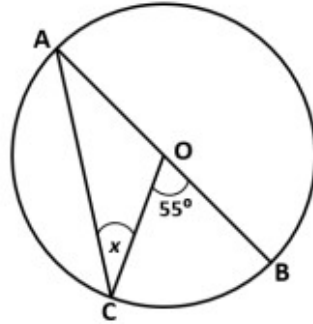
      (a) 27.5°   (b) 55°

      (c) 110°   (d) 125°

(xiv) What is the general term of the AP 3, 7, 11, 15, ...?

    (a) $4n - 1$ (b) $4n + 1$

    (c) $4n + 3$ (d) $4n + 5$

(xv) The median of a given frequency distribution is found graphically with the help of:

    (a) Histogram   (b) Frequency Cure

    (c) Frequency polygon   (d) Ogive

Question: 2

(i) Anil opened an RD Account in HDFC bank and deposits Rs.800 per month for $1\frac{1}{2}$ years. If he received Rs15084 at the time of maturity, find the rate of interest per annum. [4]

(ii) If a, b, c are in continued proportion, prove that:

$(a + b + c)(a - b + c) = a^2 + b^2 + c^2.$ [4]

(iii) Prove that: $\dfrac{sec\ A}{sec\ A - 1} + \dfrac{sec\ A}{sec\ A + 1} = 2\ \text{cosec}^2 A.$ [4]
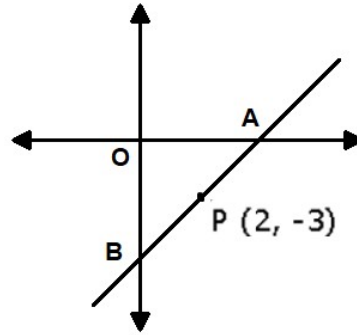
Question: 3

(i) The inner circumference of the rim of a circular metal tub is 44cm. [4]
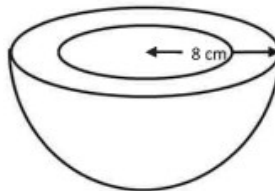
Find: (a) The inner radius of the tub.

         (b) The volume of the material of the tub if it's outer radius is 8 cm. Use $\pi = \dfrac{22}{7}$.

(ii) A and B are two points on the x-axis and y-axis respectively and $P(2, -3)$ is the mid-point of AB. Find: [4]

(a) the co-ordinates of A and B,

(b) slope of AB,

(c) equation of line AB.

(iii) Use graph paper for this question:

(a) Plot the points $A(4, 4), B(4, -6), C(8, 0)$ the vertices of $\triangle ABC$.

(b) Reflect ABC on the y-axis and name it as A'B'C'.

(c) Write the coordinates of the image A', B' and C'.

(d) Give the geometrical name for the figure AA'C'B'BC.

(e) Identify the line of symmetry of AA'C'B'BC. [5]

Section-B [40 Marks]

*(Answer **any four** questions from this Section.)*

Question: 4

(i) A shopkeeper buys an article from a wholesaler for Rs 2000 and sells it to a consumer at 10% profit. If the rate of GST is 12%, find the tax liability of the shopkeeper. [3]

(ii) Solve the quadratic equation $x^2 - 5x - 10 = 0$. Write your answer correct to 2 decimal places. [3]

(iii) Find the mean of the following distribution by step deviation method. [4]

Class interval	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	10	6	8	12	5	9

Question: 5

(i) Given $A = \begin{bmatrix} 3 & a \\ -4 & 8 \end{bmatrix}$, $B = \begin{bmatrix} c & 4 \\ -3 & 0 \end{bmatrix}$, $C = \begin{bmatrix} -1 & 4 \\ 3 & b \end{bmatrix}$ and $3A - 2C = 6B$, find the values of a, b and c. [3]

(ii) ABC is a right angled triangle with AB = 12 cm and AC = 13 cm. A circle, with centre O, has been inscribed inside the triangle. Find the radius of the circle. [3]
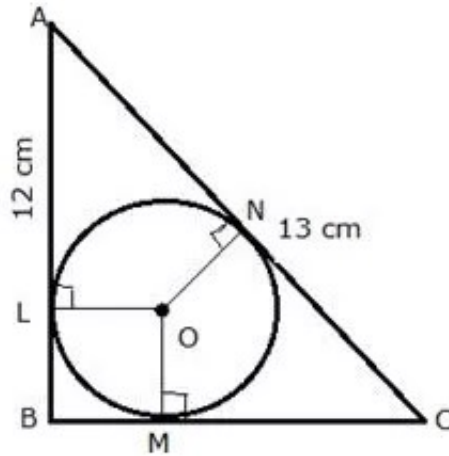
(iii) Factorise the given polynomial completely, using Remainder Theorem.

$6x^3 + 25x^2 + 31x + 10$. [4]

Question: 6

(i) A line segment joining the points $A(-1, \frac{5}{3})$ and $B(a, 5)$ is divided in the ratio $1 : 3$ at P, the point where the line segment AB intersects the y-axis.

(a) Calculate the value of a.

(b) Calculate the coordinates of P. [3]

(ii) Prove that: $\sqrt{\frac{1 - \cos A}{1 + \cos A}} = \operatorname{cosec} A - \cot A$ [3]

(iii) Solve: $25 + 22 + 19 + 16 + \cdots + x = 115$. [4]

Question: 7

(i) A die has 6 faces marked by the given numbers as shown below:

| 1 | 2 | 3 | −1 | −2 | −3 |

The die is thrown once. What is the probability of getting:

(i) a positive integer.

(ii) an integer greater than −3.

(iii) the smallest integer. [3]

(ii) A cubical ice-cream brick of edge 22 cm is to be distributed among some children by filling ice cream cones of radius 2 cm and height 7 cm up to its brim. Find the number of children who will get the ice cream cones. [3]

(iii) In the given figure, ABCD is a cyclic quadrilateral and PQ is a tangent to the smaller circle at E. If $\angle AEP = 70^0, \angle BOC = 110^0$, find: [4]

(a) $\angle ECB$

(b) $\angle BEC$

(c) $\angle BFC$

(d) $\angle DAB$
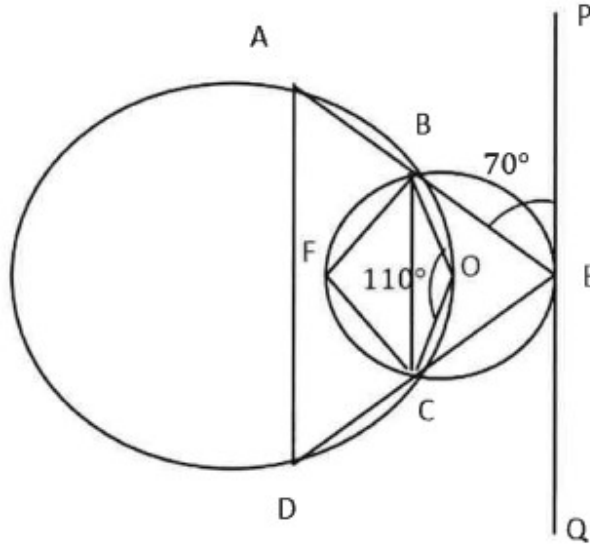
Question: 8

(i) Solve the given inequation and graph it on a number line: [3]

$$-3 < -\frac{1}{2} - \frac{2x}{3} \le \frac{5}{6}, x \in R.$$

(ii) Calculate the median and mode for the following distribution: [3]

Weight (in kg)	35	47	52	56	60
No. of students	4	3	5	3	2

(iii) ABCD is a trapezium in which AB || DC and P,Q are points on AD and BC respectively, such that PQ || DC if PD = 18 cm, BQ = 35 cm and QC = 15 cm, find AD. [4]

Question: 9

(i) A farmer has 70 m of fencing, with which he encloses three sides of a rectangular sheep pen; the fourth side being a wall. If the area of the pen is 600 sq. m, find the length of its shorter side. [4]

(ii) Use a graph sheet for this question. The daily wages of 120 workers working at a site given below: [6]

Wages (in Rs)	250-300	300-350	350-400	400-450	450-500	500-550	550-600
No. of workers	8	15	20	30	25	15	7

Use 2 cm = Rs 50 and 2 cm = 20 workers along x-axis and y-axis respectively to draw an ogive and hence estimate:

(a) The median wages

(b) The inter-quartile range of wages.

(c) Percentage of workers whose daily wage is above Rs 475.

Question: 10

(i) Find x from the following equation using properties of proportion: [3]

$$\frac{x^2-x+1}{x^2+x+1} = \frac{14(x-1)}{13(x+1)}$$

(ii) Using ruler and compass, construct a triangle PQR, given RQ = 10 cm, ∠PRQ = 75° and base RP = 8 cm. Also, circumscribe the triangle. [3]

(iii) Two poles AB and PQ are standing opposite each other on either side of a road 200 m wide. From a point R between them on the road, the angles of elevation of the top of the poles AB and PQ are 45° and 40° respectively. If height of AB = 80 m, find the height of PQ correct to the nearest metre. [4]