ICSE 2024 EXAMINATION

MATHEMATICS

SAMPLE PAPER - 9

Time Allowed : 2½ hours *Max. Marks : 80*

General Instructions :

Attempt all questions from 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 intended marks for questions or parts of questions are given in brackets [ ]
Mathematical tables are provided.

SECTION - A (40 Marks)

(Attempt *all* questions from this Section)

Question 1 : Choose the correct answers to the questions from the given options: [15]

(i) Rate of return on investment is given by :

(a) $\frac{\text{investment} \times \text{dividend}}{100}$ (b) $\frac{\text{investment}}{\text{dividend}} \times 100$ (c) $\frac{\text{dividend}}{\text{investment}} \times 100$ (d) $100 \times \text{investment} \times \text{dividend}$

(ii) The quadratic equation $2x^2 - \sqrt{5}x + 1 = 0$ has :

(a) two distinct real roots (b) two equal real roots (c) no real roots (d) more than two real roots

(iii) On dividing a polynomial $f(x)$ by $(3x - 4)$, the remainder is :

(a) $f\left(\frac{4}{3}\right)$ (b) $f\left(\frac{3}{4}\right)$ (c) $f\left(-\frac{4}{3}\right)$ (d) $f(0)$

(iv) If the 1st and nth term of a GP be x and y respectively and a be the product of first n terms, then :

(a) $a^2 = x + y$ (b) $a^2 = (xy)^n$ (c) $a^2 = \left(\frac{x}{y}\right)^n$ (d) $a^2 = (xy)^2$

(v) For a model, if the scale factor is k, then volume of the model is :

(a) $k \times$ volume of the actual figure (b) $k^2 \times$ volume of the actual figure

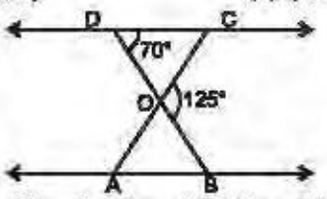
(c) $\frac{1}{k^3} \times$ volume of the actual figure (d) $k^3 \times$ volume of the actual figure

(vi) The reflection of the point $(-3, -1)$ in the origin is the point :

(a) (1, 3) (b) (3, 1) (c) (–3, 1) (d) (0, 0)

(vii) In the figure, if $\Delta ODC \sim \Delta OBA$, then measure of $\angle OAB$ is :

(a) 125°
(b) 55°
(c) 70°
(d) 110°



(viii) An iron rod of length 8 cm and radius 0.5 cm is drawn into wire of length 18 m of uniform thickness. The thickness of the wire is:

(a) 0.1 mm (b) 0.33 mm (c) 0.11 mm (d) 0.67 mm

(ix) If $8 - x \leq 4x - 2$, $x \in N$, then the solution set is :

(a) {2, 3, 4, ...} (b) {3, 4, 5, ...} (c) {0, 1, 2} (d) {2, 3, 4, 5, 6}

(x) The probability of getting a multiple of 2 in a throw of an unbiased die is:

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

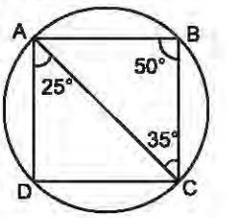
(xi) If $A = \begin{bmatrix} 2 & 0 \\ 1 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 4 & -1 \\ 0 & 2 \end{bmatrix}$, then A + B is equal to :

(a) $\begin{bmatrix} 6 & -1 \\ 1 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 2 & 2 \\ 1 & 4 \end{bmatrix}$ (c) $\begin{bmatrix} -1 & 5 \\ 6 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} -1 & 5 \\ 4 & 2 \end{bmatrix}$

(xii) Point P divides the join of A(3, 5) and B(7, 9) internally in the ratio 2 : 3. The coordinates of P are :

(a) $\left(\frac{13}{5}, \frac{23}{5}\right)$ (b) $\left(\frac{23}{5}, \frac{33}{5}\right)$ (c) $\left(\frac{33}{5}, \frac{23}{5}\right)$ (d) none of these

(xiii) In the given figure, ABCD is a cyclic quadrilateral in which $\angle CAD = 25°$, $\angle ABC = 50°$ and $\angle ACB = 35°$. Then $\angle DAB$ is:



(a) 50° (b) 70°
(c) 120° (d) 130°

(xiv) For an AP, $T_n = 4n + 1$. Then the common difference of the AP is :

(a) 5 (b) 4 (c) –4 (d) –5

(xv) Construction of a cumulative frequency distribution table is useful in determining the:

(a) mean (b) median (c) mode (d) all the three measures

Question 2 :

(i) Manohar has a 4 years cumulative Time Deposit Account in a bank and deposits ₹ 650 per month. If he receives ₹ 36,296, at the time of maturity, find the rate of interest. [4]

(ii) A man invests a sum of money in ₹25 shares, paying 12% dividend and quoted at ₹36. If his annual income from these shares is ₹720, calculate: [4]

(a) the number shares bought by him (b) his total investment
(c) the percentage return on his investment

(iii) Find the least value of n for which the sum $1 + 3 + 3^2 + \ldots$ to n terms is greater than 7000? [4]

Question 3 :

(i) The scale of a map is 1 : 2,00,000. A plot of land of area 10 km^2 is to be represented on the map. Find: [4]

(a) the length in km on the ground represented by 1 cm on the map.
(b) the area in km^2 that can be represented by 3 cm^2 on the map.
(c) the area on the map representing the plot of land.

(ii) Find the equation of the line passing through (2, 3) and perpendicular to the line $2x + 4y = 7$. [4]

(iii) Use a graph sheet for this question. [5]

Take 1 cm = 1 unit along both x and y axis.

(a) Plot the following points: A(0, 5), B(3, 0), C(1, 0) and D(1, –5)
(b) Reflect the points B, C and D on the y axis and name them as B', C' and D' respectively.
(c) Write down the coordinates of B', C' and D'.
(d) Join the points A, B, C, D, D', C', B', A in order and give a name to the closed figure ABCDD'C'B'.

SECTION - B (40 Marks)

(Attempt *any four* questions from this Section)

Question 4 :

(i) A jeweller X in Lucknow sold three diamond necklaces having marked prices ₹5,00,000, ₹6,00,000 and ₹10,00,000 to another jeweller Y in Lucknow. Jeweller X incurred shipping charges of ₹10,000 per necklace and provided a Diwali discount of 1%. If the rate of GST is 28%, then find (a) IGST (b) CGST (c) SGST. [3]

(ii) Find the values of x which satisfy the inequation :

$$-2 \le \frac{1}{2} - \frac{2x}{3} \le 1\frac{5}{6}, x \in N$$

Graph the solution set on the number line. [3]

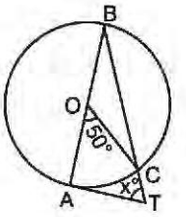
(iii) Draw a histogram for the following data. From the histogram, estimate the mode. [4]

Marks	10–20	20–30	30–40	40–50	50–60
Number of students	12	35	45	25	13

Question 5 :

(i) Given $A = \begin{bmatrix} 1 & 1 \\ 8 & 3 \end{bmatrix}$, evaluate $A^2 - 4A$.

(ii) In the given figure, AB is a diameter of the circle with centre O and $\angle OAT = 90°$ and C is a point on the circle. Calculate the numerical value of x. [3]



(iii) On dividing $y^3 - 3y^2 - ky + 4$ by $(y - 2)$, the remainder is 16. Find the value of k.

Question 6 :

(i) Find the equation of a line which has y-intercept 4 and is parallel to the line $2x - 3y = 7$. Find the coordinates of the point where the line cuts x-axis. [3]

(ii) If $(\cos\theta + \sin\theta) = \sqrt{2}\cos\theta$, prove that $(\cos\theta - \sin\theta) = \sqrt{2}\ \sin\theta$. [3]

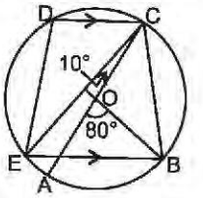
(iii) If the nth term of the AP 9, 7, 5, ... is same as the nth term of the AP 15, 12, 9, ..., find n. [4]

Question 7 :

(i) A letter is selected at random from the letters of the word MATHEMATICS. What is the probability that it is :
(a) m? (b) a consonant? (c) a vowel? [3]

(ii) The difference between the outside and inside surfaces of a cylindrical pipe, 14 cm long is 44 cm^2. If the pipe is made of 99 cm^3 of metal, find the outer and inner radius of the pipe. [3]

(iii) In the figure, AC is a diameter of the circle with centre O. CD and BE are parallel. $\angle AOB = 80°$ and $\angle ACE = 10°$.
Calculate : (a) $\angle BEC$ (b) $\angle BCD$ (c) $\angle CED$. [4]



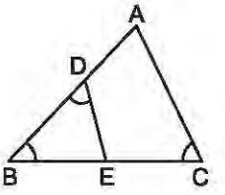
Question 8 :

(i) Solve the following quadratic equation : $x^2 - 4x + 2 = 0$.

(ii) Find the mean of the following distribution, using short cut method. [3]

Height of plant (in cm)	120–140	140–160	160–180	180–200	200–220	220–240
Number of plants	4	10	20	12	6	8

(iii) In the given figure, ABC is a triangle with $\angle EDB = \angle ACB$. Prove that $\Delta ABC \sim \Delta EBD$. If BE = 6 cm, EC = 4 cm, BD = 5 cm and area of ΔBED = 9 cm^2, find : [4]
(a) the length of AB
(b) the area of ΔABC



Question 9 :

(i) Construct a ΔABP with AB = 6 cm, $\angle ABP = 45°$ and BP = 5 cm. Complete the rectangle ABCD such that [4]
(a) P is equidistant from AB and BC
(b) P is equidistant from A and D.

(ii) The daily profits in rupees of 100 shops in a departmental store are distributed as follows :

Profit per shop (in ₹)	0–100	100–200	200–300	300–400	400–500	500–600
Number of shops	12	18	27	20	17	6

Draw an ogive for the data given above on a graph paper and estimate the median. [6]

Question 10 :

(i) Using the properties of proportion, solve for x: $\dfrac{\sqrt{x+5}+\sqrt{x-16}}{\sqrt{x+5}-\sqrt{x-16}} = \dfrac{7}{3}$ [3]

(ii) Construct a regular hexagon of side 3 cm. Inscribe a circle in it. [3]

(iii) The angles of elevation of the top of the tower from two points on the ground at distances a m and b m from the base of the tower and in the same straight line with it are complementary. Prove that the height of the tower is $\sqrt{ab}$ m. [4]

ANSWERS

1. (i) (c) (ii) (c) (iii) (a) (iv) (b) (v) (d) (vi) (b) (vii) (b) (viii) (d) (ix) (a)
(x) (c) (xi) (c) (xii) (b) (xiii) (c) (xiv) (b) (xv) (b)

2. (i) 8% p.a. (ii) (a) 240 (b) ₹8640 (c) $8\frac{1}{3}\%$ (iii) 9

3. (i) (a) 2 km (b) 12 km^2 (c) 2.5 cm^2 (ii) $2x - y = 1$ (iii) (c) (–3, 0), (–1, 0), (–1, –5)
(d) Arrowhead

4. (i) (a) 0 (b) ₹2,95,260 (c) ₹2,95,260 (ii) {1, 2, 3} (iii) 34 Marks

5. (i) $\begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix}$ (ii) 65° (iii) –8 **6.** (i) $3y - 2x = 12$; (–6, 0) (iii) 7

7. (i) (a) $\frac{2}{11}$ (b) $\frac{7}{11}$ (c) $\frac{4}{11}$ (ii) 2.5 cm, 2 cm (iii) (a) 50° (b) 100° (c) 30°

8. (i) 3.41, 0.59 (ii) 180 cm (iii) (a) 12 cm (b) 36 cm^2

9. (ii) ₹274 **10.** (i) $x = 20$