

**ICSE 2023 EXAMINATION,
FINAL PRACTICE PAPER-3
MATHEMATICS**

Time: Two and half hours

Maximum Marks: 80

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.

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.

Section A

(Attempt all questions from this Section)

Question: 1

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

(i) A dealer purchased a machine from a manufacturer for ₹10,000 and sold it to a retailer at a profit of 10%. The rate of GST is 18%. The amount of input CGST for the dealer is:

(a) Rs 1800

(b) Rs 900

(c) Rs 0

(d) Rs 10900

(ii) Which of the following is a quadratic equation?

(a) $(x + 4)(2x - 1) = (2x + 3)(x - 2)$

(b) $(x - 1)^3 = x^3 - 2x^2$

(c) $x(x + 1) = (x + 3)(x - 3)$

(d) $(x - 3)^2 + 1 = x^2 + 2 + 4$

(iii) Which of the following statement is not true?

(a) All identity matrices are square matrix.

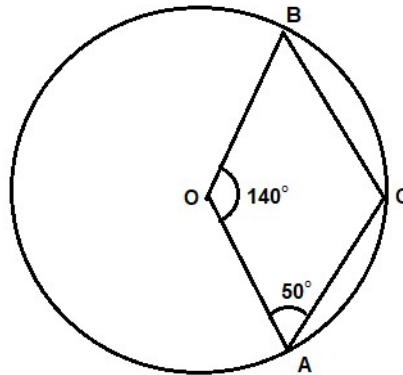
(b) All null matrices are square matrix.

(c) For a square matrix number of rows is equal to the number of columns.

(d) A square matrix all of whose elements except those in the leading diagonal are zero is the diagonal matrix.

- (iv) Which of the following quadratic equations has real and equal roots?
- (a) $x^2 + 2\sqrt{3}x + 3 = 0$ (b) $2x^2 - 3x - 5 = 0$
(c) $4x^2 + 8x + 1 = 0$ (d) $x^2 - 4x + 1 = 0$
- (v) Given $A \times \begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix} = [p \quad q \quad r]$. The order of matrix A is:
- (a) 3×2 (b) 3×3
(c) 1×2 (d) 1×3
- (vi) What is the 11 terms from the end of the arithmetic progression: 12, 6, 0, -6, ..., -60?
- (a) -48 (b) -6
(c) 0 (d) 12
- (vii) Which of the following points is invariant under reflection in both the x-axis and y-axis?
- (a) (0, 0) (b) (2, 2)
(c) (-3, 3) (d) (1, -1)
- (viii) The perimeters of two triangles ABC and PQR are 60 cm and 36 cm respectively. If PQ = 9cm, then AB equals:
- (a) 6 cm (b) 10 cm
(c) 15 cm (d) 24 cm
- (ix) By melting a solid sphere of radius 5 cm a solid right circular cone of the same circular base radius is made. The height of cone is:
- (a) 20 cm (b) 10 cm
(c) 5 cm (d) 12 cm
- (x) The solution set of the inequation $7x - 4(3 - x) \geq 3(2x - 5)$ when $x \in \{-3, -2, -1, 0, 1, 2, 3\}$
- (a) $\{0, 1, 2, 3\}$ (b) $\{-2, -1, 0, 1, 2, 3\}$
(c) $\{0, 1, 2\}$ (d) $\{-3, -2, -1, 0, 1\}$
- (xi) Out of consonants of the English alphabet, one letter is selected at random. The probability of selecting 'g' is:
- (a) $\frac{1}{26}$ (b) $\frac{1}{21}$
(c) $\frac{21}{26}$ (d) $\frac{5}{26}$
- (xii) The centroid of a ΔABC is G(6,7). If the coordinates of the vertices A, B and C are (a, 5), (7, 9) and (5, 7) respectively. The value of a is:
- (a) 9 (b) 6
(c) 3 (d) 7

- (xiii) In the figure, given below, O is the centre of the circle. If $\angle AOB = 140^\circ$ and $\angle OAC = 50^\circ$. Find $\angle ACB$.



- (a) 100° (b) 110°
 (c) 115° (d) 120°
- (xiv) What is the general term of the AP $-6, -3, 0, 3, \dots$?
 (a) $3n - 9$ (b) $3n - 6$
 (c) $3n - 3$ (d) $3n$
- (xv) Which of the following cannot be found graphically?
 (a) Mean (b) Mode
 (c) Median (d) None of these

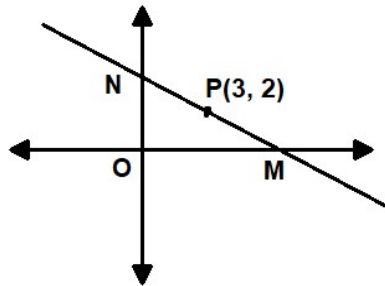
Question: 2

- (i) Mr. Jacob has a two years RD account in State Bank of India and deposits Rs.1500 per month. If he receives Rs.37,875 at the time of maturity, find the rate of interest. [4]
- (ii) If b is the mean proportion between a and c , prove that: $\frac{a^4 + a^2b^2 + b^4}{b^4 + b^2c^2 + c^4} = \frac{a^2}{c^2}$. [4]
- (iii) Prove that: $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 5 + \sec^2 A \cdot \operatorname{cosec}^2 A$ [4]

Question: 3

- (i) A hemi-spherical bowl of internal radius 9 cm is full of liquid. This liquid is to be filled into conical shaped small containers each of diameter 3 cm and height 4 cm. How many containers are necessary to empty the bowl? [4]
- (ii) M and N are two points on the X axis and Y axis respectively. $P(3, 2)$ divides the line segment MN in the ratio 2 : 3. Find: [4]

- (a) the co-ordinates of M and N,
- (b) slope of MN,
- (c) equation of line MN.



- (iii) Use graph paper for this question: (Take 2 cm = 1 unit on both axes).
- (a) Plot the points A (- 4, 2) and B (2, 4).
 - (b) A' is the image of A when reflected in the y-axis. Plot it on the graph paper and write the coordinates of A'.
 - (c) B' is the image of B when reflected in the line AA'. Write the coordinates of B'.
 - (d) Write the geometric name of the figure ABA'B'.
 - (e) Name a line of symmetry of the figure formed. [5]

Section-B [40 Marks]

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

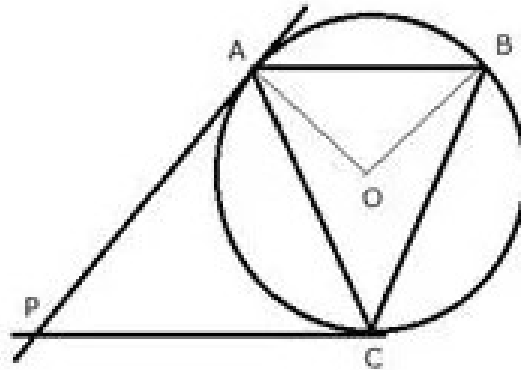
Question: 4

- (i) A dealer buys an article for ₹6000 from a wholesaler. The dealer sells the article to a consumer at 15% profit. If the sales are intra-state and the rate of GST is 18%, find:
 - (a) input CGST and input SGST paid by the dealer.
 - (b) output CGST and output SGST collected by the dealer.
 - (c) the total amount paid by the consumer. [3]
- (ii) Solve the quadratic equation $5x^2 - 2x - 10 = 0$. Write your answer correct to 2 decimal places. [3]
- (iii) Use graph sheet for this question. Draw a histogram for the following data, and use it to find mode. [4]

Pocket expenses (in Rs)	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
No. of students	10	14	28	42	50	30	14	12

Question: 5

- (i) Given $A = \begin{bmatrix} 2 & 1 \\ 3 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 1 \\ 5 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} -3 & -1 \\ 0 & 0 \end{bmatrix}$, find the values of $2A - 3B + C$. [3]
- (ii) In the given figure, O is the centre of the circum-circle ABC. Tangents at A and C intersect at P. Given angle $AOB = 140^\circ$ and angle $APC = 80^\circ$; find the angle BAC. [3]



- (iii) Factorise the given polynomial completely, using Remainder Theorem.
 $2x^3 + x^2 - 13x + 6$. [4]

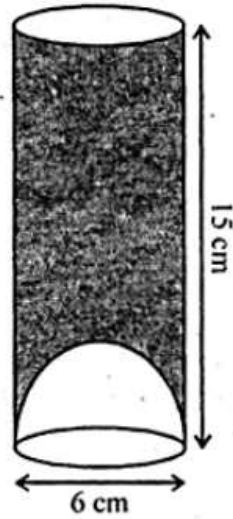
Question: 6

- (i) The equation of a line is $2x - 2\sqrt{3}y - \sqrt{3} = 0$. Find:
(a) the gradient of the line.
(b) the inclination of the line.
(c) the y-intercept of the line. [3]
- (ii) Prove that: $\frac{\sin A \tan A}{1 - \cos A} = 1 + \sec A$ [3]
- (iii) Find the sum of first 10 terms of an AP whose 12th term is -13 and sum of first four terms is 24. [4]

Question: 7

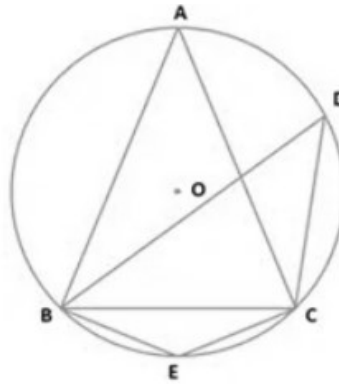
- (i) Cards bearing numbers 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20 are kept in a bag. A card is drawn at random from the bag. Find the probability of getting a card which is:
(a) a prime number.
(b) a number divisible by 4.
(c) a number that is a multiple of 6. [3]

- (ii) In the given figure, the bottom of the glass has a hemispherical raised portion. If the glass is filled with orange juice, then find the quantity of juice which a person will get. [3]



- (iii) In the given figure, $\angle DBC = 58^\circ$, BD is a diameter of the circle. Calculate: [4]

- (a) $\angle BCD$
 (b) $\angle BDC$
 (b) $\angle BEC$
 (c) $\angle BAC$



Question: 8

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

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

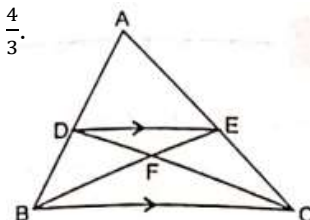
- (ii) The following table gives the petrol prices per litre for a period of 50 days. [3]

Price (Rs.)	85-90	90-95	95-100	100-105	105-110
No. of days	12	10	8	15	5

Find the mean price of petrol per litre to the nearest rupee using step-deviation method.

- (iii) In the given figure, ABC is a triangle. $DE \parallel BC$ and $\frac{AD}{BD} = \frac{4}{3}$. [4]

- (a) Determine the ratios $\frac{AD}{AB}$ and $\frac{DE}{BC}$.
 (b) Prove that $\triangle DEF \sim \triangle CBF$.



Question: 9

- (i) The difference of the squares of two natural numbers is 84. The square of the larger number is 25 times the smaller number. Find the numbers. [4]

- (ii) Marks obtained by 200 students in an examination are given below: [6]

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	5	11	10	20	28	37	40	29	14	6

Draw an ogive for the given distribution taking $2\text{ cm} = 10\text{ marks}$ on one axis and $2\text{ cm} = 20\text{ students}$ on the other axis. Using the graph, determine:

- (i) The median marks
(ii) The number of students who failed if minimum marks required to pass is 40.
(iii) If scoring 85 and more marks is considered as grade one, find the number of students who secured grade one in the examination.

Question: 10

- (i) Using properties of proportion, find $x : y$ if: [3]

$$\frac{x^3 + 12x}{6x^2 + 8} = \frac{y^3 + 27}{9y^2 + 27}$$

- (ii) Using ruler and compass, construct a regular hexagon of side 4.5 cm. [3]

Hence, construct a circle circumscribing the hexagon. Measure and write down the length of the circum-radius.

- (iii) An observer standing on the top of a lighthouse 150 m above the sea level watches a ship sailing away. As he observes, the angle of depression of the ship changes from 50° to 30° . Determine the distance travelled by the ship during the period of observation. Give your answers correct to the nearest metre. (Use Mathematical Table for this question.)