

**Sample Paper 3**  
**ICSE 2024 EXAMINATION**  
**MATHEMATICS**

**Time: Two and half hours**

**Max. Marks: 80**

**General Instructions:**

1. Answer to this paper must be written on the paper provided separately.
  2. You will not be allowed to write during first 15 minutes.
  3. This time is to be spent in reading the question paper.
  4. The time given at the head of this Paper is the time allowed for writing the answers.
  5. Attempt all questions from Section A and any four questions from Section B.
  6. All working, including rough work, must be clearly shown, and must be done on the same sheet as the rest of the answer.
  7. Omission of essential working will result in loss of marks.
  8. The intended marks for questions or parts of questions are given in brackets [ ].
  9. 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]

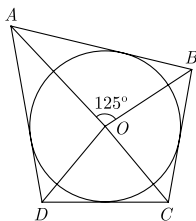
(Do not copy the questions, write the correct answer only.)

- (i) Rashi purchases an article for ₹5310 which includes a discount of 10% on the marked price and 18% GST on the selling price. The marked price of the article is:
- |            |            |
|------------|------------|
| (a) ₹4,200 | (b) ₹5,000 |
| (c) ₹5,500 | (d) ₹5,900 |
- (ii) Gaurishakar opened a R.D. account in PNB Bank for 20 months. If the rate of interest is 9% per annum and he received ₹441 as interest at the end of maturity, then the monthly installment is
- |          |          |
|----------|----------|
| (a) ₹280 | (b) ₹250 |
| (c) ₹200 | (d) ₹320 |
- (iii) Which of the following is the equation of a line with  $x$ -intercept  $-3$  and passing through the point  $(-2, 5)$ .
- |                       |                       |
|-----------------------|-----------------------|
| (a) $5x + y - 15 = 0$ | (b) $x - 5y + 15 = 0$ |
| (c) $x + 5y - 15 = 0$ | (d) $5x - y + 15 = 0$ |

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- (iv) The solution set for the inequation  $2x + 7 \leq 17$ ,  $x \in W$  is :
- (a)  $\{1, 2, 3, 4, 5\}$  (b)  $\{0, 1, 2, 3, 4, 5\}$   
(c)  $\{1, 2, 3, 4\}$  (d)  $\{0, 1, 2, 3, 4\}$
- (v) The equation  $x^2 + 2x + 1 = (4 - kx)^2 + 3$  will be quadratic, if the value of  $k$  is:
- (a)  $k = 1$  (b)  $k \neq 1$   
(c) Any number (d) Insufficient data
- (vi) If  $a : b = \frac{1}{2} : \frac{3}{8}$  and  $b : c = \frac{1}{3} : \frac{5}{9}$  then  $a : c$  is:
- (a)  $1 : 9$  (b)  $1 : 4$   
(c)  $2 : 3$  (d)  $4 : 5$
- (vii) What is the remainder when  $f(x) = x^2 - 4x + 2$  is divided by  $2x + 1$  ?
- (a)  $\frac{1}{2}$  (b)  $\frac{9}{4}$   
(c)  $\frac{3}{4}$  (d)  $\frac{17}{4}$
- (viii) If  $A = \begin{bmatrix} 3 & 5 \\ 1 & 4 \end{bmatrix}$ ,  $B = \begin{bmatrix} 2 & 4 \\ 0 & 3 \end{bmatrix}$  and  $C = \begin{bmatrix} 1 & -1 \\ 2 & 1 \end{bmatrix}$  then  $5A - BC$  is :
- (a)  $\begin{bmatrix} -5 & -23 \\ 1 & 17 \end{bmatrix}$  (b)  $\begin{bmatrix} 5 & 23 \\ 1 & 17 \end{bmatrix}$   
(c)  $\begin{bmatrix} -2 & 8 \\ -3 & 3 \end{bmatrix}$  (d)  $\begin{bmatrix} 5 & 23 \\ -1 & 17 \end{bmatrix}$
- (ix) The value of  $x$  for which  $2x$ ,  $(x + 10)$  and  $(3x + 2)$  are the three consecutive terms of an AP, is
- (a) 6 (b)  $-6$   
(c) 18 (d)  $-18$
- (x) The point  $P$  on  $x$ -axis equidistant from the points  $A(-1, 0)$  and  $B(5, 0)$  is
- (a)  $(2, 0)$  (b)  $(0, 2)$   
(c)  $(3, 0)$  (d)  $(-3, 5)$
- (xi) Which of the following is the line with  $x$ -intercept 4 and passing through the point  $(-2, 5)$ .
- (a)  $5x + 6y - 20 = 0$  (b)  $5x + 6y + 10 = 0$   
(c)  $5x - 6y + 20 = 0$  (d)  $5x - 6y + 10 = 0$
- (xii)  $\Delta ABC$  is an equilateral triangle with each side of length  $2p$ . If  $AD \perp BC$  then the value of  $AD$  is
- (a)  $\sqrt{3}$  (b)  $\sqrt{3}p$   
(c)  $2p$  (d)  $4p$

(xiii) In figure, if  $\angle AOB = 125^\circ$ , then  $\angle COD$  is equal to



- (a)  $62.5^\circ$  (b)  $45^\circ$   
(c)  $35^\circ$  (d)  $55^\circ$

(xiv) The base radii of a cone and a cylinder are equal. If their curved surface areas are also equal, then the ratio of the slant height of the cone to the height of the cylinder is

- (a) 2 : 1 (b) 1 : 2  
(c) 1 : 3 (d) 3 : 1

(xv) Given that  $\sin \alpha = \frac{\sqrt{3}}{2}$  and  $\cos \beta = 0$ , then the value of  $\beta - \alpha$  is

- (a)  $0^\circ$  (b)  $90^\circ$   
(c)  $60^\circ$  (d)  $30^\circ$

## QUESTION 2.

- (i) A silo is a structure for storing bulk materials. Silos are used in agriculture to store grain or fermented feed known as silage. [4]



A silo is in the shape of cylinder surmounted by a conical top. The height and diameter of cylindrical part are 40 feet and 42 feet respectively and the slant height of conical part is 29 feet.

- (a) How much metal sheet is required to make this silo ?  
(b) Find the cost of metal sheet needed to make the silo if the metal sheet is available at the rate of Rs. 250 per square feet.  
(c) What is the storage capacity of silo ?
- (ii) Mr. Sonu has a recurring deposit account and deposits ₹ 750 per month for 2 yr. If he gets ₹ 19125 at the time of maturity, find the rate of interest. [4]

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(iii) Prove that  $\frac{\sin A}{1 + \cot A} - \frac{\cos A}{1 + \tan A} = \sin A - \cos A$  [4]

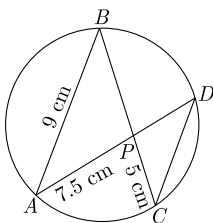
### QUESTION 3.

- (i) A man invests ₹4500 in shares of a company which is paying 7.5% dividend. [4]  
If ₹ 100 shares are available at a discount of 10%.

Find

- Number of shares he purchases.
- His annual income.

- (ii) In the given figure  $AB = 9$  cm,  $PA = 7.5$  cm and  $PC = 5$  cm. Chords  $AD$  and  $BC$  intersect at  $P$ . [4]



- Prove that  $\Delta PAB \sim \Delta PCD$ .
  - Find the length of  $CD$ .
  - Find area of  $\Delta PAB$  : Area of  $\Delta PCD$ .
- (iii) Use graph paper for this question. The marks obtained by 120 students in an English test are given below [5]

Marks	Number of students
0-10	5
10-20	9
20-30	16
30-40	22
40-50	26
50-60	18
60-70	11
70-80	6
80-90	4
90-100	3

Draw the ogive and hence, estimate

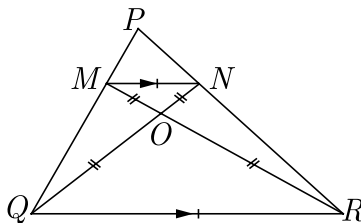
- the median marks.
- the number of students who did not pass the test if the pass percentage was 50.
- the upper quartile marks.

## SECTION - B

(Attempt any four questions.)

### QUESTION 4.

- (i) If  $A = \begin{bmatrix} 3 & 0 \\ 5 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} -4 & 2 \\ 1 & 0 \end{bmatrix}$  find  $A^2 - 2AB + B^2$  [3]
- (ii) Using ruler and compass construct a  $\triangle ABC$  where  $AB = 3$  cm,  $BC = 4$  cm and  $\angle ABC = 90^\circ$ . Hence construct a circle circumscribing the  $\triangle ABC$ . Measure and write down the radius of the circle. [3]
- (iii) In  $\triangle PQR$ ,  $MN$  is parallel to  $QR$  and  $\frac{PM}{MQ} = \frac{2}{3}$ . [4]
- (a) Find  $\frac{MN}{QR}$ .
- (b) Prove that  $\triangle OMN$  and  $\triangle ORQ$  are similar.
- (c) Find-area of  $\triangle OMN$  : area of  $\triangle ORQ$ .



### QUESTION 5.

- (i) The mean of the following frequency distribution is 25. Find the value of  $p$ . [3]

Class interval	0-10	10-20	20-30	30-40	40-50
Frequency	4	6	10	6	$p$

- (ii) Mrs. Roy went to a departmental store and bought the following items from a departmental store : [3]

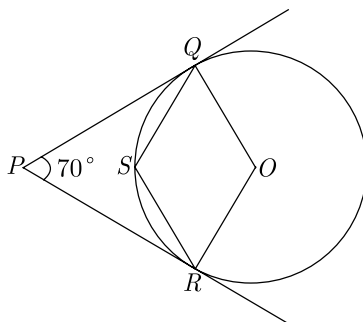
S. No.	Item	Price	Quantity	Rate of GST
(a)	Walnut	₹750 Per Pack	2	5%
(b)	Unbranded Atta	₹40 Per Kg.	20 Kg.	0%
(c)	Butter	₹200 Per Pack	5	12%

Find the :

- (a) Total GST paid.
- (b) Total bill amount including GST.

- (iii) In the given figure  $O$  is the centre of the circle.  $PQ$  and  $PR$  are tangents and  $\angle QPR = 70^\circ$ . Calculate. [4]

- (a)  $\angle QOR$
- (b)  $\angle QSR$



### QUESTION 6.

- (i) If  $a, b, c$  are in AP, then show that  $10^{ax+10}, 10^{bx+10}, 10^{cx+10}, x \neq 0$ , are in G.P. [3]
- (ii) The minimum age of children to be eligible to participate in a painting competition is 8 years. It is observed that the age of youngest boy was 8 years and the ages of rest of participants are having a common difference of 4 months. If the sum of ages of all the participants is 168 years, find the age of eldest participant in the painting competition. [3]
- (iii) Draw a histogram and hence estimate the mode for the following frequency distribution. [4]

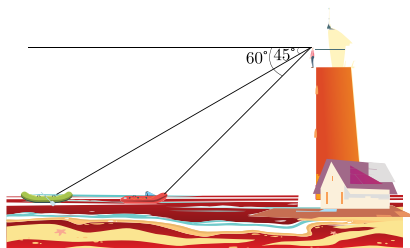
Class	0- 10	10-20	20-30	30-40	40-50	50-60
Frequency	2	8	10	5	4	3

### QUESTION 7.

- (i) The vertices of a  $\triangle ABC$  are  $A(3, 8)$ ,  $B(-1, 2)$  and  $C(6, -6)$ . Find the [5]
- (a) slope of  $BC$ .
  - (b) equation of a line perpendicular to  $BC$  and passing through  $A$ .

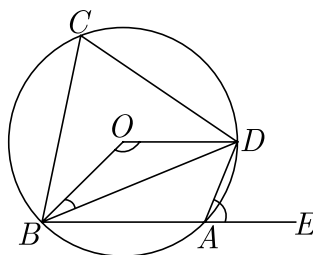
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- (ii) From the observation deck of a seaside building 200 m high, Jignesh sees two fishing boats in the distance. The angle of depression to the nearer boat is  $60^\circ$  while for the boat farther away the angle is  $45^\circ$ . [5]
- (a) How far out to sea is the nearer boat?
- (b) How far apart are the two boats?



### QUESTION 8.

- (i) Solve the following inequation and represent the solution set on the number line. [3]
- $$\frac{3x}{5} + 2 < x + 4 \leq \frac{x}{2} + 5, x \in R$$
- (ii) In the given figure,  $O$  is the centre of the circle.  $\angle DAE = 70^\circ$ . Find giving suitable reasons, the measure of [3]
- (a)  $\angle BCD$
- (b)  $\angle BOD$
- (c)  $\angle OBD$



- (iii) In what ratio does the  $x$ -axis divide the line segment joining The point  $(-4,-6)$  and  $(-1,7)$ ? Also find the coordinates of the point of division. [4]

### QUESTION 9.

- (i) Using componendo and dividendo solve for  $x$ : [3]
- $$\frac{\sqrt{2x+2} + \sqrt{2x-1}}{\sqrt{2x+1} - \sqrt{2x-1}} = 3$$

- (ii) The difference of two natural numbers is 5 and the difference of their reciprocals is  $\frac{1}{10}$ .  
Find the numbers. [3]
- (iii) Using ruler and compass, construct [4]
- a  $\triangle ABC$  in which  $AB = 5.5$  cm,  $BC = 3.4$  cm and  $CA = 4.9$  cm.
  - the locus of points equidistant from  $A$  and  $C$ .
  - a circle touching  $AB$  at  $A$  and passing through  $C$ .

### QUESTION 10.

- (i) Use factor theorem to factorise  $6x^3 + 17x^2 + 4x - 12$  completely. [3]
- (ii) Total 1000 elementary and secondary schools of Rajasthan were classified by the number of computers they had. [3]

Computers	1–10	11–20	21–50	51–100	100 more
Schools	250	210	290	170	80

Choose one school at random and find the following probability.

- Find the probability that it has 50 or fewer computers.
  - Find the probability that it has more than 100 computers.
  - Find the probability that it has no more than 20 computers.
  - Find the probability that it has more than 50 computers.
- (iii) The point  $A(4, -1)$  is reflected as  $A'$  in  $y$ -axis. Point  $B$  on reflection in  $x$ -axis is mapped as  $B'(-2, 5)$ . [4]
- Write the coordinates of  $A'$  and  $B$ .
  - Write the coordinates of the middle point of the line segment  $A'B$ .

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