II-TERM EXAMINATION : 2023-24

CLASS - X (ICSE)

MATHEMATICS

Time: 2½ hrs. M.M.: 80

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

Attempt all the 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 the loss of marks.

The intended marks for questions or parts of question are given in the brackets [ ].

Mathematical tables are provided.

SECTION 'A' [40 Marks]

(Attempt all questions from this section)

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

i) If $\begin{bmatrix} x+2y & 3y \\ 4x & 2 \end{bmatrix} = \begin{bmatrix} 0 & -3 \\ 8 & 2 \end{bmatrix}$, then the value of (x - y) is :

a) -3 b) 1 c) 5 d) 3

ii) If on dividing $4x^2 - 3kx + 5$ by x + 2, the remainder is -3 ; then the value of 'k' is :

a) 4 b) - 4 c) 3 d) - 3

iii) A dealer in Mumbai sold a washing machine to a consumer in Mumbai for ₹ 18000 . If the rate of GST is 18%, then SGST is :

a) ₹ 1620 b) ₹ 3240

c) ₹ nil d) none of these

iv) For the quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$. The discriminant is :

a) $b^2 - 4ac$ b) $\sqrt{b^2 - 4ac}$

c) $-b \pm \sqrt{b^2 - 4ac}$ d) $\frac{-b}{2a}$

v) The sum of first 'n' terms of an A.P. is $4n - n^2$, the first term of this A.P. is :

a) -2 b) 4 c) -1 d) 3

vi) When a die is thrown, the probability of getting an odd number less than 3 is :

a) 0 b) $\frac{1}{3}$ c) $\frac{1}{2}$ d) $\frac{1}{6}$

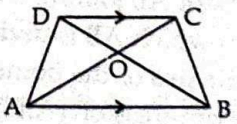
vii) In the figure AB||DC, OA=5 cm, OB=6 cm and OC= 4 cm, then the length of OD is :

a) 4.8 cm

b) 7.5 cm

c) 7 cm

d) 6.2 cm



viii) The first and last term of an A.P. are 17 and 350 respectively. If its common difference is 9, then the number of terms in the A.P. is :

a) 38 b) 48 c) 37 d) 36

ix) The solution set for the inequation $2x + 4 \leq 14$, $x \in W$ 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}

x) Which of the following point is invariant with respect to the line x = - 2 :

a) (3, 2) b) (3, -2) c) (2, 3) d) (-2, -3)

xi) The inclination of the line y = x + 5 is :

a) 30° b) 60° c) 45° d) none of these

xii) The centroid of a ΔABC is G (6, 7). If the co-ordinates of the vertices A, B and C are (a, 5), (7, 9) and (5, 7) respectively. The value of 'a' is :

a) 9 b) 7 c) 3 d) 6

xiii) 1) Shares of company A, paying 10%, ₹ 500 are at ₹ 550.

2) Shares of company B, paying 12%, ₹ 100 are at ₹ 120.

3) Share of company C, paying 10%, ₹ 500 are at ₹ 450 .

Shares of which company are below par ?

a) Company A

b) Company B

c) Company C

d) Company A and C

xiv) For a given sequence : $a_1, a_2, a_3 \ldots\ldots$

Assertion (A) : A list of (non-zero) numbers is called a geometric progression (G.P.) if and only if the ratio of any term to its preceding term is a constant i.e. a fixed number.

Reason (R) : 5, 10, 20, 40, ... this sequence is a G.P.

a) A is true R is false

b) A is false R is true

c) both A and R are true

d) both A and R are false

xv) Which of the following equation represent a line passing through the point (–1, 1) ?

a) $2x - 3y - 5 = 0$

b) $3x - 2y + 5 = 0$

c) $-x + y + 2 = 0$

d) $y = -6$

Q.2. i) Using factor theorem factorise $x^3+10x^2-37x+26$ [4]

ii) Salman opened a recurring deposit account in a bank and deposited ₹ 800 per month for $1\frac{1}{2}$ years. If he received ₹ 15084 at the time of maturity, find : [4]

a) the interest earned

b) the rate of interest

iii) Using properties of proportion, find a : b , given : [4]

$$\frac{a^3+3ab^2}{b^3+3a^2b}=\frac{63}{62}$$

Q.3. i) Given a line segment AB joining the points A(– 4, 6) and B(8, –3), find : [4]

a) the ratio in which AB is divided by the y-axis.

b) the co-ordinates of the point of intersection.

ii) In an Arithmetic progression (A.P.) the fourth and sixth terms are 8 and 14 respectively. Find : [4]

a) first term ('a')

b) common difference ('d')

c) sum of first 30 terms

iii) Use graph paper sheet for this question : [5]

a) Plot the points : A(0, 5), B(3, 0), C(1, 0) and D(1, –5)

b) Reflect the point 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)

Q.4. i) If $A=\begin{bmatrix}3 & 0\\ 5 & 1\end{bmatrix}$ and $B=\begin{bmatrix}-4 & 2\\ 0 & 1\end{bmatrix}$ find : A^2+AB [3]

ii) Mr. Rao visits the departmental store and buys the following articles : [3]
Medicines costing ₹ 550, GST @ 18%
A pair of shoes costing ₹ 2000, GST @ 12%
A school bag costing ₹ 1000 with a discount 20% , GST @ 18 %. Calculate the total amount of GST paid by him.

iii) Find the value of p' if the lines, $5x - 3y + 2 = 0$ and $6x - py + 7 = 0$ are perpendicular to each other. Hence find the equation of a line passing through (-2, -1) and parallel to $6x - py + 7 = 0$ [4]

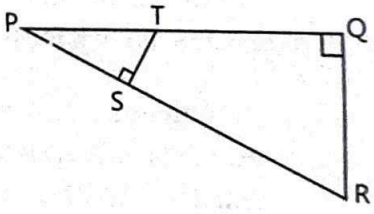
Q.5. i) A bag contains 5 white balls, 6 red balls and 9 green balls. A ball is drawn at random from the bag. Find the probability that the ball drawn is : [3]
a) not a green ball
b) a white or green ball
c) neither a green ball nor a red ball.

ii) Solve for x the quadratic equation $x^2 - 4x - 8 = 0$. Give your answer correct to two significant figures. [3]

iii) Using the remainder theorem find the remainders obtained when the polynomial $x^3 + kx^2 + 8x + k$ is divided by $(x+1)$ and $(x-2)$. Hence find k if the sum of two remainders is $(5k+23)$. [4]

Q.6. i) The first and last term of a geometrical progression (G.P) are 3 and 96 respectively. If the common ratio is 2, find : [3]
a) 'n' the number of terms of the G.P.
b) sum of 'n' terms.

ii) In the given figure, $\angle PQR = \angle PST = 90°$, $PQ = 5$ cm, $PS = 2$ cm. [3]
a) prove that $\Delta PQR \sim \Delta PST$
b) Find area ΔPQR : area of quadrilateral SRQT

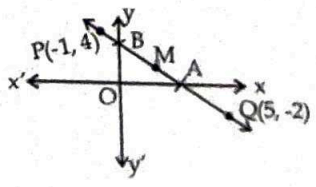


iii) Solving the following inequation, write the solution set and represent it on the number line. [4]

$$-3(x-7) \geq 15 - 7x > \frac{x+1}{3}, \quad x \in R$$

Q.7. i) Rohan takes 12 days less than the days taken by Ravi to complete a certain work. If both working together, takes 8 days to complete the work, find the number of days taken by Rohan and Ravi to complete the whole work, working alone. [5]

ii) A straight line passes through the point P(-1, 4) and Q(5, -2). It meets the coordinate axes at points A and B. If M is the mid point of line segment AB. Find : [5]
a) the equation of the line PQ.
b) the co-ordinates of A and B.
c) the co-ordinates of M.



Q.8. i) Solve the following inequation, write down the solution set and represent it on the real number line. [3]

$$-2+10x \le 13x+10 < 24+10x,\ x \in Z$$

ii) A man invests ₹ 4500 in shares of a company which is paying 7.5% divided. If ₹ 100 shares are available at a discount of 10%, find : [3]

a) the number of shares he purchases

b) his annual income.

iii) Given $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix} M = 6I$, where M is a matrix and I is unit matrix of order (2×2). [4]

a) State the order of matrix M.

b) Find the value of matrix M.

Q.9. i) If $\frac{a}{b}=\frac{c}{d}=\frac{e}{f}$, prove that : [3]

$$\frac{a^2}{b^2}+\frac{c^2}{d^2}+\frac{e^2}{f^2}=\frac{ac}{bd}+\frac{ce}{df}+\frac{ae}{bf}$$

ii) There are 25 discs numbered 1 to 25. They are put in a closed box and shaken thoroughly. A disc is drawn at random from the box. Find the probability that the number on the disc is : [3]

a) an odd number

b) divisible by 2 and 3 both.

c) a number less than 19.

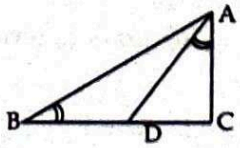
iii) Using ruler and compass only, construct a semicircle with diameter BC= 7 cm. Locate a point on the circumference of the semicircle such that A is equidistant from B and C. Complete the cyclic quadrilateral ABCD such that D is equidistant from AB and BC. Measure ∠ADC and write it down. [4]

Q.10. i) Find the value (s) of k for which the quadratic equation $2x^2+kx+3=0$ has equal roots. [3]

ii) In the given figure, ∠ABC =∠DAC and AB = 8 cm, AC = 4cm, AD = 5 cm. [3]

a) prove that ΔACD is similar to ΔBCA

b) find BC and CD



iii) The sum of first six terms of an A.P. is 42. The ratio of the 10th term to the 30th term is 1 : 3. Calculate the first and the 13 th term. [4]

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