THE FIRST COMPARATIVE EXAMINATI N 2022-23

Class X (ICSE)

MATHEMATICS

Time: Two hours and a half **Maximum**

Instructions:

- *Answers to this paper must be written on the answer script provided separately.*
- *You will **NOT** be allowed to write during the first **15** minutes. This time is to be spent i reading the question paper.*
- *The time given at the head of this paper is the time allowed for writing the answers.*
- *Answer **all** questions in **Section A** Attempt **any four** questions from **Section B***
- *All working, including rough work must clearly be shown and must be done on the sam sheet as the rest of the answer. Omission of essential working will result in loss of ma*
- *The intended marks for questions or parts of questions are given in brackets [ ].*
- ***Mathematical tables** and **graph papers** shall be provided to you*

SECTION A [40 marks]

*Attempt **all** questions from this section.*

Question 1

(a) Solve the following inequation and represent the solution set on the number line:

$-1 \le 3 + 4x < 23,\ x \in R$

(b) Anuj has a recurring deposit account of ₹ 600 per month for $2\frac{1}{2}$ years. Find the amount he gets at the time of maturity, if the rate of interest is 10% p.a.

c) A card is drawn at random from a set of identical cards numbered 20 to 40. Fin the probability that the number on the card drawn is:

(i) a prime number (ii) a multiple of 5

(iii) a multiple of 4 or 5 (iv) a multiple of 2 nd 5.

stion 2

If $\begin{bmatrix} 1 & 4 \\ -2 & 3 \end{bmatrix} + 2X = 3\begin{bmatrix} 3 & 2 \\ 0 & -3 \end{bmatrix}$, find matrix X.

What number should be subtracted from $2x^3 - 3x^2 + x$ so that the resulting polynomial leaves the remainder 5 when divided by $x - 2$?

Use a graph paper for this question. Take 2 cm = 1 unit along both the axes

PQRS is a quadrilateral whose vertices are P(2, 2), Q(2, –2), R(0, –1) and S(0, 1).

(i) Reflect quadrilateral PQRS on the *y*-axis and name it P'Q'RS.

(ii) Write down the coordinates of P' and Q'.

(iii) Name two points which are invariant under the above reflection.

(iv) Name the polygon P'Q'RS.

This paper consists of Four printed pages.

Question 3

(a) If $a : b = c : d$, using properties of proportion, show that:

$$(9a + 13b)(9c - 13d) = (9c + 13d)(9a - 13b)$$ [3]

(b) Solve the following quadratic equation and give your answer correct to two significant figures:

$$x^2 - 2(x + 1) = 0$$ [3]

(c) The polynomial $2x^3 + ax^2 + bx - 2$ leaves remainders 7 and 0 when divided by $2x - 3$ and $x + 2$ respectively. Find the values of a and b. [4]

Question 4

(a) Given $A - 2I = 3\begin{bmatrix} -1 & 0 \\ 4 & 1 \end{bmatrix}$, where I is the unit matrix of order 2×2.

Find matrix A. [3]

(b) Find the value of k for which the following equation has equal roots:

$$3x^2 - 12x + (k - 5) = 0$$ [3]

(c) Find the amount of bill for the following intra-state transaction of goods and services: [4]

MRP (in ₹)	12000	15000	9500
Discount %	30	20	30
CGST %	6	9	14

SECTION B [40 marks]

*Attempt **any four** questions from this section.*

Question 5

(a) If x, 12, 18, y are in continued proportion, find x and y. [3]

(b) A bag contains 24 white balls and some black balls. The probability of drawing a black ball is one-third of the probability of drawing a white ball. Find the total number of balls in the bag. [3]

(c) Use a graph paper for this question.

(i) Plot the points A(1, 4) and B(−1, 2).

(ii) A′ is the image of A when reflected in the line $y = 0$. Write down the coordinates of A′ and plot it on the graph paper.

(iii) B′ is the image of B when reflected in the line AA′. Write down the coordinates of B′ and plot it.

(iv) Write down the geometrical name for the closed figure ABA′B′. [4]

Question 6

(a) Paul is x years old and his father's age is twice the square of Paul's age. Ten years hence, father's age will be four times Paul's age. Find their present ages. [3]

(b) Given $A = \begin{bmatrix} 2 & 1 \\ 0 & -2 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 1 \\ -3 & -2 \end{bmatrix}$ and $C = \begin{bmatrix} -3 & 2 \\ -1 & 4 \end{bmatrix}$.

Find $AC - 5B$. [3]

(c) Using the Factor theorem, factorise the following polynomial completely:

$$3x^3 + 10x^2 + x - 6$$ [4]

Question 7

(a) Solve the following inequation and graph the solution on the number line:

$$-2 \le \frac{1}{2} - \frac{2x}{3} \le 1\frac{5}{6},\ x \in I$$ [3]

(b) Find two numbers such that the mean proportional between them is 14 and third proportional to them is 112. [3]

(c) A shopkeeper sells an article for ₹ 4260 with GST = 12%. A customer asks the shopkeeper to reduce the price of the article so that he pays only ₹ 4480 including GST. How much reduction will the shopkeeper give if he agrees? [4]

Question 8

(a) If A is the solution set of $7x - 2 > 4x + 1,\ x \in R$ and B is the solution set of $9x - 45 \ge 5(x - 5),\ x \in R$; represent $A \cap B$ on number line along with representation of A and B on different number lines. [3]

(b) A die is thrown once. Find the probability of getting:

(i) a number less than 2

(ii) a prime number

(iii) a perfect square number. [3]

(c) Manoj has a recurring deposit account for 3 years at 6% p.a. simple interest. If he gets ₹ 8325 as interest at the time of maturity, find:

(i) the monthly instalment (ii) the amount of maturity. [4]

Question 9

(a) If $x = \dfrac{\sqrt{a+1} + \sqrt{a-1}}{\sqrt{a+1} - \sqrt{a-1}}$, using properties of proportion, show that:

$$x^2 - 2ax + 1 = 0$$ [3]

(b) Given $\begin{bmatrix} 3 & -8 \\ 9 & 4 \end{bmatrix} \times M = \begin{bmatrix} -2 \\ 8 \end{bmatrix}$, state the order of matrix M and find matrix M. [3]

(c) Shubhika received ₹ 12440 on maturity from her recurring deposit account. If she deposited ₹ 1200 per month in her recurring deposit account and the rate of interest was 8% p.a., find the time (in months) for which the account was held [4]

Question 10

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

$$\frac{1}{3} \leq \frac{x}{2} + 1\frac{2}{3} < 5\frac{1}{6}, \quad x \in W.$$

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

(b) By selling an article for ₹ 21, a shopkeeper loses as much percent as the cost price of the article. Calculate the cost price. [3]

(c) Use a graph paper for this question.

(i) Plot the points A(2, 3) and B(−2, 3). From A and B, draw perpendiculars AP and BQ on the x-axis.

(ii) Write the coordinates of points P and Q.

(iii) Name the image of A on reflection in the origin.

(iv) Assign the geometrical name to the figure APBQ. [4]

Question 11

(a) If two coins are tossed once, what is the probability of getting:

(i) two heads

(ii) atleast one tail

(iii) both heads or both tails? [3]

(b) The polynomials $2x^4 - x^2 - (k+3)x - 6$ and $x^3 - kx^2 + x + 6$ leave the same remainder when divided by $x - 3$. Find the value of k. [3]

(c) A shopkeeper sells an article at the marked price of ₹ 3600. The rate of GST on the article is 12%. If the sales are intra-state and the shopkeeper pays a tax (under GST) of ₹ 42 to the Central Government, find the amount inclusive of tax at which the shopkeeper purchased the article from the wholesaler. [4]