HALF YEARLY EXAMINATION

SESSION (2024-2025)

Subject – Maths

Std. X

Maximum Marks: 80
Time allowed : 150 minutes.

Answer to this paper must be written on the paper provided separately.
You will not be allowed to write during the first 10 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*** questions from **Section A** and ***any four*** questions from **Section B.**
The intended marks for questions or parts of questions are given in the brackets [ ]

Section A [40 Marks]

[Attempt all questions from this section.]

Question 1 **[15]**

Choose the correct answer to the questions from the given options.

(i) *If* $\begin{bmatrix} 2 & 0 \\ 0 & 4 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ -8 \end{bmatrix}$, the value of x and y respectively are:

(a) 1, -2 (b) -2, 1 (c) 1, 2 (d) -2, -1

(ii) Manu Purchases some goods for ₹2000 and sells them for ₹2,500. If the rate of GST is 18%, the tax liability on Manu is.

(a) ₹360 (b)₹450 (c) ₹90 (d) ₹900

(iii) Naveen deposits ₹800 every month in a recurring deposit account for 6 months. If he receives ₹4884 at the time of maturity, then the interest he earns is:

(a) ₹84 (b) ₹42 (c) ₹24 (d) ₹284

(iv) 500, ₹50 share at par earn a dividend of ₹1,250 in one year. The rate of dividend is:

(a) 10% (b) 7.5% (c) 12.5% (d) 5%

(v) For $7 - 3x < x - 5$, the solution is

(a) $x > 3$ (b) $x < 3$ (c) $x \geq 3$ (d) $x \leq 3$

(vi) For quadratic equation $2x + \frac{5}{x} = 5$,

(a) $x \neq 0$ (b) $x = 1$ (c) $x = 5$ (d) $x = 2$

(vii) Two integers differ by 2 and sum of their square is 52. The integers are.

(a) 4 and 6 (b) 4 or 6 (c) -4 or 6 (d) – 4 and – 6 or 6 and 4

(viii) The mean proportional between 4 and 9 is

(a) 4 (b) 6 (c) 9 (d) 36

(ix) The nth term of an arithmetic progression (A.P) is $2n + 5$. The 10th term is

(a) 7 (b) 15 (c) 25 (d) 45

(x) Factors of $4 + 4x - x^2 - x^3$ are:

(a) $(2 + x)(2 - x)(1 + x)$ (b) $(x - 2)(1 + x)(2 + x)$

(c) $(x + 2)(x - 2)(1 - x)$ (d) $(2 + x)(x - 1)(2 - x)$

Question 5

(i) Find the geometrical progression with fourth term = 54 and seventh term = 1458. [3]

(ii) The point $p(a, b)$ is first reflected in the origin and then reflected in the y −axis to p' If p' has co-ordinate $(4, 6)$; evaluate a and b. [3]

(iii) Points A,B,C and D divide the line segment joining the point (5, -10) and the origin in the five equal parts. Find the co-ordinates of B and D [4]

Question 6

(i) The points (K, 3), (2, -4) and (-k+1, -2) are collinear find K. [3]

(ii) Divide 96 into four parts which are in A.P and ratio between product of their means to the product of their extremes is 15:7 [3]

(iii) Which term of the G.P, 2, $2\sqrt{2}$, 4..... is $128\sqrt{2}$ [4]

Question 7

(i) Solve the following equation using factorisation method. [3]

$\frac{x-3}{x+3} + \frac{x+3}{x-3} = 2\frac{1}{2}$

(ii) If 4^2, 4 and 9 are in continued proportion, then find the value of 4 [3]

(iii) Factorise the expression, [4]

$f(x) = 2x^3 - 7x^2 - 3x + 18$, hence find all possible values of x for which $f(x) = 0$

Question 8

(i) $If\ P = \begin{bmatrix} 2 & 6 \\ 3 & 9 \end{bmatrix}\ and\ Q = \begin{bmatrix} 3 & x \\ y & 2 \end{bmatrix}, find\ x\ and\ y$ such that PQ = null matrix. [3]

(ii) State the Co-ordinates of the following points under reflection in the line $x = 0$ [3]

(a) (-6, 4) (b) (0, 5) (c) (3, -4)

(iii) Solve for x using the quadratic formula. write your answer correct to two significant figure, $(x-1)^2 - 3x + 4 = 0$ [4]

Question 9

(i) ABC is a triangle, whose vertices are A(1, -1), B(0, 4) and C(-6, 4). D is the midpoint of BC.

Find:- (a) Co-ordinate of D (b) Equation of the median AD [3]

(ii) Which term of the A.P 15, 30, 45, 60.....is 300. Hence. Find the sum of all the terms of the Arithmetic Progression (A.P) [3]

(iii) A company with 10, 000 shares of nominal value ₹100 declares an annual dividend of 8% to the share- holders. [4]

(a) Calculate the total amount of dividend paid by the company.

(b) Ramesh had bough 90 shares of the company at ₹150 per share. Calculate the dividend he receives and percentage of return on his investment.

Question 10

(i) Divide 20 into two parts such that three times the square of one part exceeds the other part by 10. [3]

(ii) $If\ (a-b):(a+b) = 1:11$, find the ratio of $(5a + 4b + 15):(5a - 4b + 3)$ [3]

(iii) Calculate the ratio in which the line joining the points $(-3, -1)$ and $(5, 7)$ is divided by the line $x = 2$. Also find the co-ordinate of the point of intersection. [4]

(xi) The sum of 20 terms of the G.P 10, 20, 40,.....is

(a) $10(2^{19}-1)$ (b) $10(2^{21}-1)$ (c) $10(2^{20}-1)$ (d) None of these

(xii) The point P(x, y) is reflected in the line Y=x to the point P' (x', Y'), then

(a) $x = y$ (b) $y' = x'$

(c) $x = x' and\ y = y'$ (d) $x = y' and\ y = x'$

(xiii) The line $y = 4$ divides the join of points $(6, 7)$ and $(4, -1)$ in the ratio:-

(a) 3:5 (b) 5:3 (c) 1:5 (d) 5:1

(xiv) The slope of a line is $\sqrt{3}$, its inclination is .....

(a) 30° (b) 45° (c) 60° (d) 90°

(xv) The printed price of an article is ₹3080. If the rate of GST is 10% then the GST charged is:-

(a) ₹154 (b) ₹308 (c) ₹30.80 (d) 15.40

Question 2

(i) Find the value of 'm' if the following equation has equal roots. [4]

$(m-2)x^2 - (5+m)x + 16 = 0$

(ii) ₹250 is divided equally among a certain number of children. If there were 25 children more, each would have received 50 paise less. Find the number of children. [4]

(iii) $If\ x = \frac{\sqrt{a+3b}+\sqrt{a-3b}}{\sqrt{a+3b}-\sqrt{a-3b}}$, Prove that [4]

$3bx^2 - 2ax + 3b = 0$

Question 3

(i) Given that $(x-2)$ and $(x+1)$ are factors of $f(x) = x^3 + 3x^2 + ax + b$, calculate the values of a and b. Hence find all the factors of $f(x)$ [4]

(ii) Solve for x and y: [4]

(a) $\begin{bmatrix} 2 & 5 \\ 5 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -7 \\ 14 \end{bmatrix}$

(b) $[x+y \quad x-4] \begin{bmatrix} -1 & -2 \\ 2 & 2 \end{bmatrix} = [-7 \quad -11]$

(iii) The sum of first 7 terms of an A.P is 49 and that of first 17 terms of it is 289. find the sum of first n terms. [5]

Section 'B' (40 marks)

(Attempt any four questions from this section)

Question 4

(i) A shopkeeper sells an A.C to Ms. Alka for ₹31,200 including GST at the rate of 28%. If the shopkeeper and Ms. Alka both are from the same city. Find for the shopkeeper:

(a) Total amount of GST (b) Taxable value of AC [3]

(ii) A man has a Recurring Deposit Account in a bank for $3\frac{1}{2}$ years. If the rate of interest is 12% per annum and man gets ₹10,206 on maturity, find the value of monthly instalments. [3]

(iii) Solve the following inequation and write the solution set

$13x - 5 < 15x + 4 < 7x + 12, x \in R$. Represent the solution on a real number line. [4]