Grade - X **MATHEMATICS**

PRE - BOARD (2022-23)

Maximum Marks: 80

Time allowed: Two and half hours

Answers 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** 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 loss of marks.

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

SECTION A (40 Marks)

*(Attempt **all** questions from this Section)*

Q1) Choose the correct answers to the questions from the given options: 15

(i) A consumer bought a TV from a dealer at a discount of 20% on the marked price of Rs.40,000. If the rate of GST is 18%, then the tax paid by the consumer is :

a) 5760 b) 2880 c) nil d) 7200

(ii) A man deposited Rs.1000 per month in a recurring deposit for 3 years at 8% p.a. The maturity value is :

a) 44,000 b) 40,000 c) 40,440 d) 44,444

(iii) If $2x - 5 \leq 5x + 4 < 11\ x \in I$, then:

a) $-3 \leq x \leq 1.4$ b) $-3 \leq x \leq 2$ c) $-3 < x < 1$ d) $-3 > x$

(iv) The Discriminant of the quadratic equation $3x^2 - 4x + 2 = 0$ is :

a) 8 b) -8 c) 16 d) $-\sqrt{8}$

(v) Rs.9100 were divided among A, B and C in the ratio $\frac{1}{2}:\frac{1}{3}:\frac{1}{4}$, then A's share is:

a) 4,200 b) 2,100 c) 2,800 d) 3,000

(vi) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 0 \\ -2 & 2 \end{bmatrix}$. Find AB + BA =

a) $\begin{bmatrix} 2 & 3 \\ 12 & 8 \end{bmatrix}$ b) $\begin{bmatrix} 8 & 8 \\ 12 & 12 \end{bmatrix}$ c) $\begin{bmatrix} 12 & 8 \\ 8 & 12 \end{bmatrix}$ d) $\begin{bmatrix} 8 & 12 \\ 8 & 12 \end{bmatrix}$

(vii) Find the value of k, if $f(x) = x^2 - kx + 12$ is exactly divisible by $(x - 3)$.

a) k = 5 b) k = 15 c) k = 9 d) k = 12

(viii) For the AP -8, -4, 0, 4, ... Find the 10^{th} term is:

a) 30 b) -28 c) 28 d) -30

(ix) The reflection of the point P(-2,3) in the x-axis is _____.

a) (2,3) b) (2,-3) c) (-2,-3) d) (-2,0)

(x) If one end of a diameter of a circle is (2,3) and the centre is (-2,5), then the other end is:

a) (-6,7) b) (6,-7) c) (0,8) d) (-6,7)

(xi) The inclination of the line $y = \sqrt{3}x - 5$ is :

a) 30° b) 60° c) 45° d) 90°

(xii) There are _____ two tangents to a circle passing through a point lying outside the circle.
a) At least b) at most c) exactly d) maximum

(xiii) If R and r be the external and internal radii, and h be the height of hollow cylinder, then volume of material is:
a) $2\pi(R^2 - r^2)h$ b) $\pi(R^2 - r^2)h$ c) $\pi(r^2 - R^2)h$ d) $2\pi(R - r)h$

(xiv) If sin A + cos A = $\sqrt{3}$, then tan A + cot A=
a) -1 b) 1 b c) $\sqrt{3}+1$ d) 0

(xv) The _____ quartile is the median, denoted by Q_2
a) 4n + 3 b) 3n + 1 c) n+ 3 d) 5 + 3n

Q2) (a) Use the graph paper for this question.
The marks obtained by 120 students in an English test are given below :
[4]

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 10
No. Of students	5	9	16	22	26	18	11	6	4	

Draw the give and hence, estimate:
(i) The median marks.

(ii) The number of students who did not pass the test if the pass percentage was 50.

(iii) The upper quartile marks.

(b) Prove that :- $\frac{\sin\theta}{1-\cot\theta} + \frac{\cos\theta}{1-\tan\theta} = \cos\theta + \sin\theta$

(c) The surface area of a solid metallic sphere is 2464 cm^2. It is melted and recast into solid right circular cones of radius 3.5 cm and height 7 cm. Calculate :
(i) the radius of sphere , (ii) the number of cone recast. (take π =22/7) 4

Q3) (a) In ΔABC , $A(3,5), B(7,8), C(1,-10)$. Find the equation of the median through A. [4]

(b) Given $A = \begin{bmatrix} 2 & -6 \\ 2 & 0 \end{bmatrix}, B = \begin{bmatrix} -3 & 2 \\ 4 & 0 \end{bmatrix}, C = \begin{bmatrix} 4 & 0 \\ 0 & 2 \end{bmatrix}$ 4

Find the matrix X such that A+ 2X = 2B + C.

(c) Construct a triangle ABC in which base BC = 6cm, AB= 5.5cm and ∠ABC = 120°. 5

(i) construct a circle circumscribing the triangle ABC.

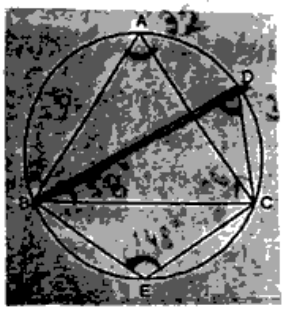
(ii) draw a cyclic quadrilateral ABCD so that D is equidistant from B and C.

SECTION B (40 Marks)
*(Attempt **any four** questions from this Section)*

Q1) a) Use the Remainder Theorem to factorise the following expression: $2x^3 + x^2 - 13x + 6$. [3]

b) Solve the following equation: $x - \frac{18}{x} = 6$, give your answer correct to two significant figures. [3]

c) In the figure , ∠DBC = 58°. BD is a diameter of the circle. Calculate: (i) ∠BDC, ∠BEC, ∠BAC [4]



Q2) a) A bag contains 5 white balls, 6 red balls and 9 green balls. A ball is drawn at random from the bag. [3]
Find the probability that the ball drawn is: (i) a green ball , (ii) a white or a red ball ,
(iii) is neither green nor a white ball.

b) Find `a' if the two polynomials $ax^3 + 3x^2 - 9$ and $2x^3 + 4x + a$, leaves the same remainder when divided by $x + 3$ [3]

c) Given $A = \begin{bmatrix} 2 & 0 \\ -1 & 7 \end{bmatrix}$ *and* $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $A^2 = 9A + MI$. Find M. [4]

Q3) a) Using properties of proportionality, solve for x. Given that x is positive : $\frac{2x + \sqrt{4x^2-1}}{2x - \sqrt{4x^2-1}} = 4$ [3]

b) P (1,-2) is a point on the line segment A (3,-6) and B (x,y) such that AP : PB is equal to 2 : 3. Find the coordinates of B. [3]

c) Use a graph paper for this question (Take 2 cm = 1 unit on both x and y axis) [4]
(i) Plot the following points : A (0,4) , B (2,3) , C (1,1) and D (2,0).

(ii) Reflect points B,C,D on the y-axis and write down their coordinates. Name the images as B' , C' , D' respectively.

(iii) Join the points A, B, C, D, D' , C' , B' and A in order.

Q4) a) Mr. Kumar a registered dealer purchased goods worth Rs. 40000 from a dealer (within the same state). If the rate of GST is 18%, [3]
(i) Calculate the input CGST and input SGST

(ii) If he sold these goods to Mr. Dev (within the state) for Rs. 50000, calculate Mr. Kumar's output CGST and output SGST.

(iii) Calculate the CGST and SGST payable by Mr. Kumar

b) Mohan opened a recurring deposit account in a bank and deposited Rs. 800 per month for $1\frac{1}{2}$ years. If he received Rs. 15084 at the time of maturity, find the rate of interest per annum. 3

c) If a : b :: c : d, show that: $\frac{a+b}{c+d} = \frac{\sqrt{2a^2+7b^2}}{\sqrt{2c^2+7d^2}}$ 4

Q5) a) Solve the in equation $2y - 3 < y + 1 \leq 4y + 7$, where $y \in \boldsymbol{R}$. Also represent the solution set on the number line. 3

b) A car covers a distance of 400 km at a certain speed. Had the speed been 12 km/hr more, the time taken for the journey would have been 1 hr 40 min. Less. Find the original speed of the car . 3

d) A Mathematics aptitude test of 50 students was recorded as follows: 4

Marks	50-60	60-70	70-80	80-90	90-100
Number of students	4	8	14	19	5

Draw a histogram for the above data using a graph paper and locate the mode

Q6) a) The sum of the 5^{th} and 9^{th} terms of an A.P. is 26 and the sum of its 7^{th} and 11^{th} terms is 42. Find the first three terms of an A.P. [3]

b) A man observes the angle of elevation of the top of a building to be 30 . He walks towards it in a horizontal line through its base.

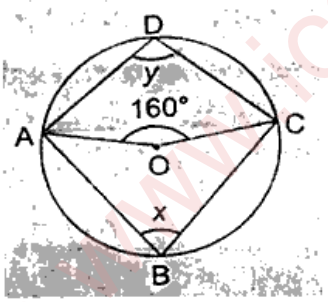
On covering 60m, the angle of elevation changes to 60 .Find the height of the building correct to the nearest meter. [3]

c) Find the value of p for which the lines $2x + 3y - 7 = 0$ *and* $4y - px - 12 = 0$ are perpendicular to each other. [4]

Q7) a) Calculate the mean of the following distribution using Short Cut Method ; [3]

Class-interval	45-50	50-55	55-60	60-65	65-70	70-75	75-80
Frequency	5	8	30	25	14	12	6

b) In the given figure, O is the centre of the circle and ∠AOC = 160°. Prove that $3\angle y - 2\angle x = 140°$. 3



c) In the figure given below, CD ∥ LA and DE ∥ AC. Find the length of CL if BE = 4 cm and EC = 2 cm. 4