FULL SYLLABUS TEST

Class: X ICSE **MATHEMATICS** **Full Marks: 80**

Time: 3 hrs.

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

(Attempt all questions from this Section)

Question 1

Choose the correct answers to the questions from the given options. **[15]**

(Do not copy the question, write the correct answers only)

(i) An article which is marked at Rs. 5000 is available at a discount of 20% and the rate of GST is 18%. The amount of SGST is (intra state transaction)

(a) Rs. 720 (b) Rs. 360 (c) Rs. 900 (d) none of these

(ii) A ball is drawn at random from a box contain 12 white, 16 red, and 20 green. What is the probability that the ball drawn is white

(a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{1}{3}$

(iii) Which of the following equation has an angle of inclination as 45°

(a) $3x - 2y + 5 = 0$ (b) $x - 2y = 0$ (c) $x - y + 5 = 0$ (d) none of these

(iv) Ajay deposited a certain sum of money for 1 year at 8% p.a. in R.D account. If he gets Rs. 104 as interest, then the monthly installment is

(a) Rs. 100 (b) Rs. 200 (c) Rs. 500 (d) none of these

(v) **Assertion(A):** Product AB of the two matrix A and B is possible.
Reason(R): Number of columns of matrix A is equal to the number of rows in matrix B.

(a) A is true, R is false (b) A is false, R is true
(c) Both A and R are true and R is the correct reason (d) Both A and R are true and R is incorrect reason for A

(vi) The co-ordinate of an invariant point under reflection in the line $x = 3$ is

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

(vii) The solution set of the inequation $3 \geq \frac{x-4}{2} + \frac{x}{3} \geq 2, x \in I$

(a) {3, 4, 5} (b) {5, 6} (c) {4, 5, 6} (d) {5, 6, 7}

(viii) If $\tan A + \cot A = 2$. Find the value of $\tan^3 A + \cot^3 A$

(a) 1 (b) 2 (c) –1 (d) –2

(ix) If $\sqrt{\frac{2}{3}}$ is a solution of equation $3x^2 + mx + 2 = 0$ the value of m is

(a) $\pm 6\sqrt{2}$ (b) $\pm 2\sqrt{6}$ (c) $\pm 3\sqrt{6}$ (d) none of these

(x) ABCD is a cyclic quadrilateral in which AB || CD and AB is diameter. If $\angle BAC = 25^\circ$ then $\angle CAD$ is

(a) 25 (b) 30 (c) 40 (d) 65

(xi) Two chords AB and CD of a circle intersect at P inside the circle. If PA = 14.4 cm AB = 32 cm and PC = 19.8 cm. Then, length of CD is

(a) 12.8 cm (b) 17.6 cm (c) 7 cm (d) 32.6 cm

(xii) The weight (in kg) of 10 student of a class are given below 21, 28.5, 20.5, 24, 25.5, 22, 27.5, 28, 21 and 24. Find the median of their weights

(a) 48 (b) 24 (c) 12 (d) none of these

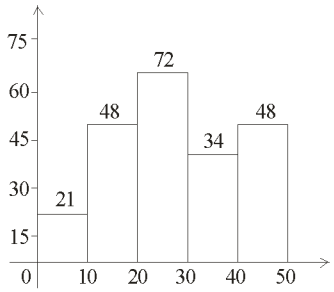
(xiii) The ratio between the area of two similar triangles is 16 : 25. Find the ratio between their corresponding medians

(a) 4 : 5 (b) 5 : 4 (c) 16 : 25 (d) none of these

(xiv) Determine the ratio of the volume of a cube to that of a sphere which will exactly fit inside the cube

(a) 11 : 21 (b) 42 : 11 (c) 21 : 11 (d) 21 : 22

(xv) In the given graph, the modal class is the class with frequency



(a) 21 (b) 48 (c) 72 (d) 36

Question 2 **[4+4+4]**

(a) Prove $\frac{1}{\text{cosec}\,\theta + \cot\theta} - \frac{1}{\sin\theta} = \frac{1}{\sin\theta} - \frac{1}{\text{cosec}\,\theta - \cot\theta}$

(b) If $x = \frac{\sqrt[3]{m+1} + \sqrt[3]{m-1}}{\sqrt[3]{m+1} - \sqrt[3]{m-1}}$ prove that $x^3 - 3x^2m + 3x - m = 0$.

(c) Use ruler and compasses only for the following question
Construct triangle BCP, when CB = 5 cm, BP = 4 cm $\angle PBC = 45^\circ$ complete the rectangle ABCD such that (i) P is equidistant from AB and BC and (ii) P is equidistant from C and D Measure and write down the length of AB.

Question 3 **[4+4+5]**

(a) Solve: $4x^2 - 4a^2x + (a^4 - b^4) = 0$

(b) The line $x - 4y - 6 = 0$ is the perpendicular bisector of the line segment PQ and the co-ordinates of P are (1, 3). Find the co-ordinate of Q.

(c) On a graph paper mark the co-ordinate axes X'OX and Y'OY. Take 2 cm = 1 unit along both the axes. Plot the point O(0, 0), A(–4, 4), B(–3, 0), C(0, –3)
(i) Reflect points A and B on the line whose equation is x = 0 and name then A' and B'. Write down their co-ordinate.
(ii) Join the points OABCB'A'O in order and name the figure formed.

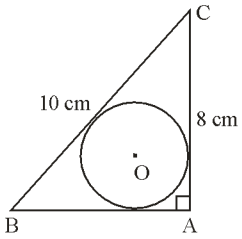
SECTION – B

(*Attempt any four questions from this section*)

Question 4 **[3+3+4]**

(a) A retailer buys an article at a discount of 15% on the printed price from a wholesaler. He marks up the price by 10% on the printed price but due to competition in the market, he allows a discount of 5% on the marked price to a buyer. If the rate of GST is 12% and the buyer pays Rs. 468.16 for the article inclusive of Tax (under GST) find (i) the printed price of the article (ii) The profit percentage of the retailer

(b) In the figure, BAC is a right angled triangle in which $\angle BAC = 90$, AC = 8 cm and BC = 10 cm O is the centre of the incircle touching the three sides. Find the area of the circle.



(c) A decorative block, which is made of two solids, a cube and a hemisphere. The base of the block is a cube with edge 5cm, and hemisphere fixed on the top has a diameter of 4.2 cm. Find the total surface area of block.

Question 5 **[3+3+4]**

(a) Mr. Jha has a Recurring Deposited Account in a bank of Rs. 800 per month at the rate of 11% p.a. If he gets Rs. 61,420 at the time of maturity. Find the total time at which the account was held.

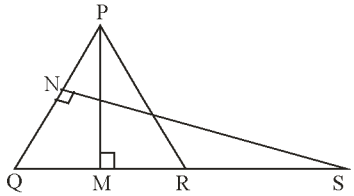
(b) Sandhya buys 350 hundred rupee shares of a company at a premium of 20% from the market. The company pays 12% dividend annually. Find (i) the investment made by sandhya (ii) her annual income from the shares (iii) the rate of return from the shares.

(c) From a window 15m high above the ground in a street, the angle of elevation and depression of the top and the foot of another house on the opposite side of the street are 30^o and 45^o respectively. Find the height of the opposites house.

Question 6 **[3+3+4]**

(a) In a given figure, PQR is an isosceles triangle in which PQ = PR = 26cm, and QR = 20 cm. PM is perpendicular to QR and SN is perpendicular to PQ. If RS = 16 cm find

(i) $\dfrac{\text{area of } \Delta PMR}{\text{area of } \Delta QSN}$ (ii) $\dfrac{\text{area of } \Delta QSN}{\text{area of } \Delta PQR}$



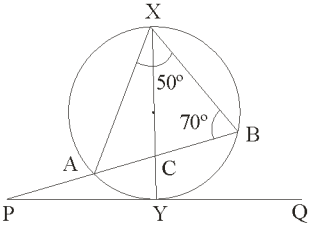
(b) Find the mean (step deviation method)

Class interval	20-30	30-40	40-50	50-60	60-70	70-80
frequency	10	6	8	12	5	9

(c) A shopkeeper buys a certain number of books for Rs. 720. If the cost per book was Rs. 5 less, the number of books that could be bought for Rs. 720 would be 2 more. Taking the original cost of each book to be Rs. x. Write an equation in x and solve it.

Question 7 **[5+5]**

(a) In a given figure XY is diameter of the circle PQ is a tangent to the circle at Y. Given that $\angle AXB = 50^o$ and $\angle ABX = 70^o$, find $\angle BAY$ and $\angle APY$.



(b) Following table shows the marks obtained by 120 students in an examination in mathematics

Marks	30-39	40-49	50-59	60-69	70-79	80-89	90-99
Number of student	1	4	10	18	45	32	10

Form a cumulative frequency table and draw an ogive use the ogive to estimate the lower quartile and upper quartile. Hence, calculate the inter quartile range.

Question 8 **[3+3+4]**

(a) If $A = \begin{bmatrix} ab & b^2 \\ -a^2 & -ab \end{bmatrix}$ find the matrix A^2.

(b) Find the value of k for which the following equation has equal roots $(k-12)x^2 + 2(k-12)x + 2 = 0$.

(c) Draw a circle with centre O and radius 3 cm. Take a point P, which is 7 cm away from the centre of the circle. Draw, two tangents from the point P to the circle.

Question 9 **[3+3+4]**

(a) Solve the given inequation and graph the solution on the number line $2y - 3 < y + 1 \leq 4y + 7,\ y \in R$.

(b) The 4^{th}, 6^{th} and the last term of a geometric progression are 10, 40 and 640 respectively. If the common ratio is positive. Find the first term, common ratio and the number of terms of the progression.

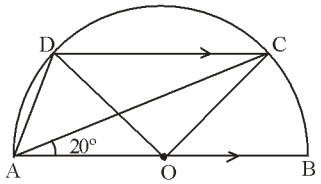
(c) In a given figure, AB is a diameter of a circle with centre O and CD || BA. If $\angle BAC = 20$ find the values of

(i) $\angle BOC$

(ii) $\angle DOC$

(iii) $\angle DAC$

(iv) $\angle ADC$



Question 10 **[3+3+4]**

(a) One card is drawn at random from a well-shuffled deck of 52 cards. Find the probability of drawing

(i) a '8' of spades

(ii) a '5' of a black suit

(iii) a red queen

(iv) a black ace

(v) face card

(vi) a king

(b) If $\sin^4\theta + \sin^2\theta = 1$. Find the value $\tan^4\theta - \tan^2\theta$.

(c) In the given figure PAB is a secant to a circle and PT is a tangent at T

(i) $\Delta PAT \sim \Delta PTB$

(ii) $PA \times PB = PT^2$