ALLEN CAREER INSTITUTE

PRELIMINARY EXAM : 2019-20

Paper Set : SET-I(HT) | **SUBJECT : Mathematics** | **Max Marks : 80**

ICSE Board - Sample Paper - 1 | **Duration : 2 Hrs.**

General Instructions :

- *You will not 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.*
- *Use of calculator and mobile devices are not allowed.*
- *Section A is compulsory. Attempt any four question from Section B.*

SECTION - A ---- (40 Marks)

Q.1 (A) The speed of a boat in still water is 15 km/hr. It can go 30 km upstream and return downstream to the original point in 4 hours 30 minutes. Find the speed of the stream. **(3 M)**

(B) The sum of the 4^{th} and 8^{th} terms of an A.P is 24 and the sum of the 6^{th} and the 10^{th} terms of the same A.P is 34. Find the first three terms of the A.P. **(4 M)**

(C) 6 is the mean proportion between two numbers x and y and 48 is third proportion to x and y. Find the numbers. **(3 M)**

Q.2 (A) If each term of a G.P. is raised to the power x, show that the resulting sequence is also a G.P. **(3 M)**

(B) Given A $\begin{bmatrix} 1 & 1 \\ -2 & 0 \end{bmatrix}$ and B $\begin{bmatrix} 2 & -1 \\ 1 & 1 \end{bmatrix}$ solve for matrix X :

(i) $X + 2A = B$ (ii) $3X + B + 2A = 0$ (iii) $3A - 2X = X - 2B$ **(4 M)**

(C) Consultancy services, worth Rs.50,000 are transferred from Delhi to Calcutta at the rate of GST 18 % and then from Calcutta to Nainital (with profit = Rs. 20,000) at the same rate of GST. Find the output tax at :

(i) Delhi (ii) Calcutta (iii) Nainital **(3 M)**

Q.3 (A) What number should be added to $3x^3 - 5x^2 + 6x$ so that when resulting polynomial is divided by $x - 3$, the remainder is 8 ? **(3 M)**

(B) The point P(3,4) is reflected to P' in the x-axis; and O' is the image of O (the origin) when reflected in the line PP'. **(4 M)**

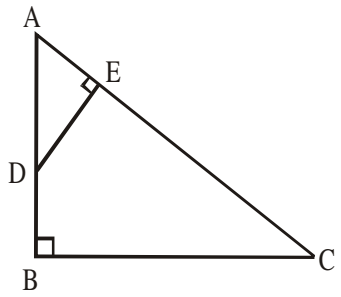
(i) The co-ordinates of P' and O'.

(ii) The length of the segments PP' and OO'.

(iii) The perimeter of the quadrilateral POP'O'.

(iv) The geometrical name of the figure POP'O'.

(C) ABC is a right angled triangle with $\angle ABC = 90°$. D is any point on AB and DE is perpendicular to AC. Prove that : **(3 M)**



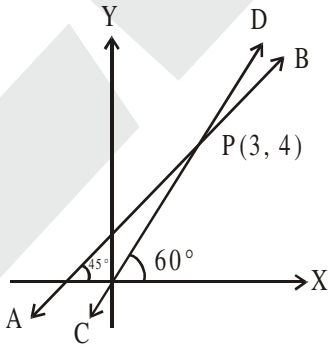
(i) $\Delta ADE \sim \Delta ACB$

(ii) If AC = 13cm, BC = 5cm and AE = 4cm. Find DE and AD.

(iii) Find, area of ΔADE. area of quadrilateral BCED.

Q.4 (A) Points A,B,C and D divide the line segment joining the point (5, –10) and origin in five equal parts. Find the co-ordinates of B and D. **(3 M)**

(B) The figure given below shows two straight lines AB and CD intersecting each other at point P(3, 4). Find the equations of AB and CD. **(4 M)**



(C) Two circle intersect at P and Q. Through P diameters PA and PB of the two circles are drawn. Show that the points A,Q and B are collinear. **(3 M)**

SECTION - B ---- (40 Marks)

Q.5 (A) Determine the ratio of the volume of a cube to that of a sphere which will exactly fit inside the cube. **(3 M)**

(B) Prove that: $\frac{\sin A - \cos A + 1}{\sin A + \cos A - 1} = \frac{\cos A}{1 - \sin A}$. **(4 M)**

(C) Find the probability of getting 53 friday's in a leap year ? **(3 M)**

Q.6 (A) Divide Rs. 20304 into two parts such that if one part is invested in 9% Rs.50 shares at 8% premium and the other part is invested in 8% Rs.25 shares at 8% discount, then the annual incomes from both the investments are equal. **(3 M)**

(B) The following table gives weekly wages of workers in a factory : **(4 M)**

Weekly wages (in Rs)	50 to 55	55 to 60	60 to 65	65 to 70	70 to 75	75 to 80	80 to 85	85 to 90
No. of workers	5	20	10	10	9	6	12	8

Calculate :

(i) the mean

(ii) the modal class

(iii) the number of workers getting weekly wages below Rs 80 and

(iv) the number of workers getting Rs 65 or more but less than Rs 85 as weekly wages.

(C) The ratio between the areas of two similar triangles is 16 : 25.Find the ratio between their :**(3 M)**

(i) Perimeters.

(ii) Altitudes.

(iii) Medians.

Q.7 (A) Construct a triangle ABC in which base BC = 5.5cm, AB = 6cm and $\angle ABC = 120°$. **(3 M)**

(i) Construct a circle circumscribing the traingle ABC.

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

(B) Two trains leave a railways station at the same time. The first train travels due west and the second train due north. The first train travels 5 km/hr faster than the second train. If after 2 hours, they are 50 km apart, find the average speed of each train. **(4 M)**

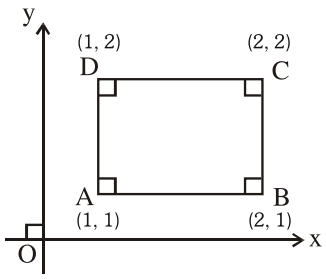
(C) Two circle with centres A and B, radii 5cm and 3cm, touch each other internally. If the perpendicular bisector of the segment AB meets the bigger circle in P and Q. Find the length of PQ. **(3 M)**

Q.8 (A) If $x \quad \frac{\sqrt{3a \quad 2b} \quad \sqrt{3a-2b}}{\sqrt{3a+2b}-\sqrt{3a-2b}}$, prove that : $bx^2 - 3ax + b = 0$

(B) The marked price of an article is Rs. 6000. A wholesaler sells it to a dealer at 20% discount. The dealer further sells the article to a customer at a discount of 10% on the marked price. If the rate of GST at each stage is 18%, find the amount of tax (under GST) paid by the dealer to the government. **(4 M)**

(C) The side AB of square ABCD is parallel to the x-axis. Find the slopes of all its sides. Also find :

(i) The slope of diagonal AC. **(3 M)**



(ii) The slopes of the diagonal BD.

Q.9 (A) The following table gives the heights of plants in centimeter. If the mean height of plants is 60.95 cm, find the value of '*f*' **(3 M)**

Height (cm)	50	55	58	60	65	70	71
No. of plants	2	4	10	*f*	5	4	3

(B) $(3x + 5)$ is a factor of the polynomial $(a - 1)x^3 + (a + 1)x^2 - (2a + 1)x - 15$. Find the value of 'a'. For this value of 'a', factorise the given polynomial completely. **(4 M)**

(C) Which is the better investment : 16 % Rs 100 shares at 80 or 20 % Rs 100 shares at 120 ? **(3 M)**

Q.10 (A) The line segment joining A(4, 7) and B(–6, –2) is intercepted by the y-axis at the point K. Write down the abscissa of the point K. Hence, find the ratio in which K divides AB. Also, find the co-ordinates of the point K. **(3 M)**

(B) A bag contains 100 identical marble stones which are numbered from 1 to 100. If one stone is drawn at random from the bag, find the probability that it bears : **(4 M)**

(i) a perfect square number,

(ii) a number divisible by 4,

(iii) a number divisible by 5,

(iv) a number divisible by 4 or 5,

(v) a number divisible by 4 and 5.

(C) Find two numbers such that the mean proportional between them is 14 and third proportional to them is 112. **(3 M)**

Q.11 (A) Find the values of x, which satisfy the inequation : **(3 M)**

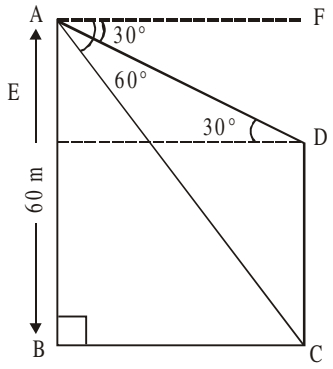
$$-2\frac{5}{6} < \frac{1}{2} - \frac{2x}{3} \le 2,\ x \in W$$

Graph the solution set on the number line.

(B) The angles of a polygon are in A.P with common difference 5°. If the smallest angle is 120°, find the number of sides of the polygon. **(4 M)**

(C) In the given figure, from the top of a building AB = 60 m high, the angles of depression of the top and bottom of a vertical lamp post CD are observed to 30° and 60° respectively. **(3 M)**

Find :



(i) The horizontal distance between AB and CD.

(ii) The height of the lamp post.