VIBGYOR HIGH

First Preliminary Examination

2019-2020

MATHEMATICS

Grade: X

Max. Marks : 80

Date : 02/12/2019

Time Allowed : 2½ hours

INSTRUCTIONS: -

- 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 the questions or parts of questions are given in brackets [ ].
- Mathematical tables are provided.
- This paper consists of 6 printed pages.

SECTION A (40 marks)

(Attempt all questions from this Section.)

Question 1

a) Solve the following inequation, write the solution set and represent it on the number line.

$$\frac{-x}{3} \leq \frac{x}{2} - 1\frac{1}{3} < \frac{1}{6}, x \in R$$

[3

b) Mr. Sharma buys 60 shares of nominal value of ₹ 100 and he decided to sell them when they are at a premium of 60%. He invests the proceeds in shares of nominal value ₹ 50, quoted at ₹ 48, paying 18% dividend annually. Calculate:

(i) the sale proceeds

(ii) the number of shares he buys

(iii) the annual dividend from these shares.

c) The mean of the following distribution is 52 and the frequency of C.I 30 – 40 is f. Find f. [4]

C.I	10 – 20	20-30	30-40	40-50	50-60	60-70	70-80
f	8	3	f	7	2	8	13

Question 2

a) R_1 and R_2 are the remainder when the polynomial $x^3 + 2x^2 - 5ax - 7$ and $x^3 + ax^2 - 12x + 6$ are divided by $x + 1$ and $x - 2$ respectively. If $2R_1 + R_2 = 6$, find the value of a.

b) Prove: $\cos^4 A - \cos^2 A = \sin^4 A - \sin^2 A$

c) 200 logs are stacked one over the other. 20 logs in bottom row, 19 in the next row, 18 in the row next to it and so on. In how many rows 200 logs are placed and how many logs are there in the top row?

Question 3

a) Find a , b , c , d: if $3\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} a & 6 \\ -1 & 2d \end{bmatrix} + \begin{bmatrix} 4 & a+b \\ c+d & 3 \end{bmatrix}$

b) If A (-2, -1), B (a, 0), C (4, b) and D (1, 2) are vertices of a parallelogram, find the values of a and b.

c) A girl fills a cylindrical bucket 32cm in height and 18cm in radius with sand. S empties the bucket on the ground and makes a conical heap of the sand. If height of the conical heap is 24cm, find:

i) its radius

ii) its slant height.

Question 4

) If b is the mean proportional between a and c, prove that:

$abc\,(a + b + c)^3 = (ab + bc + ca)^3$

Solve the quadratic equation and give your answer to two significant digit

$5x\,(x + 2) = 3$

Construct a cyclic quadrilateral ABCD in which AC = 4.5cm, $\angle ABC = 45$ AB = 3cm and AD = 2.3cm.

SECTION B (40 marks)

(Attempt any four questions from this section.)

Question 5

a) A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at a random from the box, find the probability that it bears:

i) A two - digit number.

ii) A perfect square number.

iii) A number divisible by 5. [3]

b) Mr. Gupta opened a Recurring Deposit Account in a bank. He deposited ₹ 2500 per month for 2 years. At the time of maturity, he gets ₹ 67500. Find the rate of interest per annum. [3]

c) Using a graph paper, plot A (4,6) and B (1,2).

i) Reflect A in X – axis to get the images A'.

ii) B' is the image of B, when reflected in line AA'.

iii) Give the geometrical name for the figure ABA'B'.

iv) Find the area of figure A'B'B. [4]

Question 6

a) On a map drawn to a scale of 1: 50000, a rectangular plot of land ABCD has the following dimensions. AB = 6cm; BC = 8cm and all angles are right angles. Find:

i) The actual length of diagonal distance AC of the plot in km.

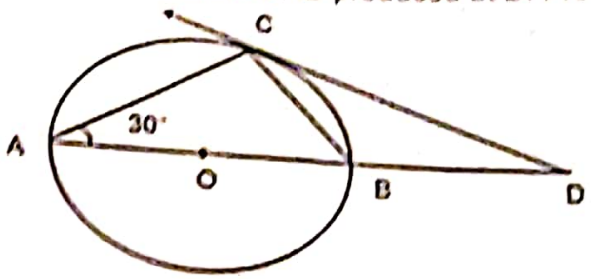
ii) The actual area of the plot in sq.km. [3]

b) The 4th term of a G. P. is square of its second term and the first term is -3. Determine the G.P.

c) A solid is in the form of a cylinder with hemispherical ends. The total height of the solid is 19cm and the diameter of the cylinder is 7cm. Find the volume and total surface area of the solid.

Question 7

a) In the given figure, AB is a diameter and AC is a chord of a circle such that $\angle BAC = 30°$. The tangent at C intersects AB produced at D. Prove that BC= BD. [3]



b) Prove: $2\sec^2 A - \sec^4 A - 2\operatorname{cosec}^2 A + \operatorname{cosec}^4 A = \cot^4 A - \tan^4 A$ [3]

c) Given matrix $A = \begin{bmatrix} 4\sin 30° & \cos 0° \\ \cos 0° & 4\sin 30° \end{bmatrix}$ and $B = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$. If $AX = B$,

i) Write the order of matrix X.

ii) Find the matrix X. [4]

Question 8

a) Which term of A.P. 3, 15, 27, 39, ... will be 120 more than its 21st term? [3]

b) If the median of 24,27, 28, 31 ,34, x, 37, 40, 42, 45, is 35, find x. In these data, if 45 is changed to 33, find the new median. [3]

c) Construct a triangle ABP such that AB = 5cm, BP = 3cm and $\angle ABP = 30°$. Complete rhombus ABCD such that P is equidistant from AB and BC. [4]

Question 9

a) Using componendo and dividendo, find the value of x:

$$\frac{\sqrt{3x+4}+\sqrt{3x-5}}{\sqrt{3x+4}-\sqrt{3x-5}} = 9$$

[3]

b) If the image of the point A (2,1) with respect to the mirror line be A' (5,2), find the equation of the mirror line.

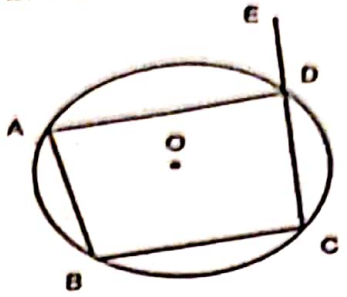
[3]

c) In the given figure, ABCD is a quadrilateral, inscribed in a circle with centre O. Side CD is produced to E. If $\angle ADE = 95°$ and $\angle OBA = 30°$, find:

i) $\angle OBC$

ii) $\angle OAC$

[4]



Question 10

a) A man invests ₹ 30000 in 15% ₹ 110 shares at ₹ 120. When the share rises to ₹ 130, he sells out enough shares to purchase a scooter for ₹ 3900. Find:

i) the number of shares he still holds.

ii) the annual change in his income.

[4]

b) The monthly income of a group of 320 employees in a company is given below:

Monthly Income (in ₹)	Number of employees
6000 – 7000	20
7000 – 8000	45
8000 – 9000	65
9000 – 10000	95
10000 – 11000	60
11000 – 12000	30
12000 - 13000	5

Draw an ogive for the given distribution on a graph sheet taking 2cm = ₹ 1000 on one axis and 2cm = 50 employees on the other axis, From the graph determine:

i) The median wage.

ii) The number of employees whose income is below ₹ 8500.

iii) If the salary of a senior employee is above ₹ 11500, find the number of senior employees of the company.

iv) The upper quartile.

Question 11

a) Divide 16 into two parts such that twice the square of the larger part exceeds the square of the smaller part by 164. [3]

b) Find the amount of bill for the following intra–state transaction of goods. The rate of GST is 12%. [3]

MRP (in ₹)	Discount (in %)
300	15
250	10
400	5
150	20

c) A man from the top of a vertical tower observes a car moving at a uniform speed coming directly towards him. If it takes 12 minutes to change the angle of depression from 30° to 45°, how soon after it, will the car reach the tower. [4]

* * * * *