K. E. CARMEL CMI SCHOOL, SARISHA

1st Terminal Examination 2021-22

Class: X **Subject: Mathematics** **Full Marks: 100** **Time: 2½hrs**

Answer to this paper must be written on the paper provided separately.
*You will not be allowed to write during the first **15min.***
This time is to be spent in reading the question paper.
Time given at the head of the paper is the time allowed for writing the answers.

*Attempt all the questions from **Section A** and any four questions from **Section B.***
All working, including rough work must be clearly shown and must be shown on the same sheet as the rest of the answers. Omission of essential working will result in the loss of marks.
The intended marks for questions or parts of the questions are given in brackets [].

Section-A (40 marks)
(Attempt all questions)

Question 1 **[3+3+4=10]**

a) Mr. R. K. Nair gets ₹ 6455 at the end of one year at the rate of 14% per annum in a deposit account. Find the monthly installment.

b) When divided by x – 3 the polynomials $x^3 - px^2 + x + 6$ and $2x^3 - x^2 - (p + 3)x - 6$ leave the same remainder. Find the value of 'p'.

c) Find the mean of the following distribution using Assumed mean method:

Class Interval	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	10	6	8	12	5	9

Question 2 **[3+3+4=10]**

a) Mr. Roy deposits ₹1000 every month in a recurring account for 3 years at 8% interest per annum. Find its maturity value.

b) Find the value of AB – BA when
$A = \begin{bmatrix} 2 & 1 \\ 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 2 \\ 1 & 0 \end{bmatrix}$

c) An integer is chosen at random from 1 to 50. Find the probability that the number is:
   i. divisible by 3.
   ii. a perfect square.
   iii. a prime number.
   iv. multiple of 4.

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

a) Solve the equation by using quadratic formula and give your answer correct to 2 significant figures: $4x^2 - 5x - 3 = 0$

b) Solve: $1 \leq 2(3x - 1) + 3 \leq 19$, $x \in R$ and mark it on the number line.

c) The line segment joining the points A (3, 2) and B (5, 1) is divided at the point P in the ratio 1 : 2 and it lies on the line $3x - 18y + k = 0$. Find the value of k.

Question 4 **[6+4=10]**

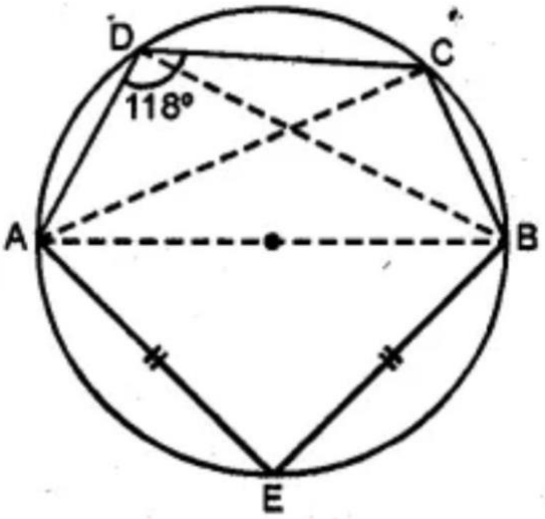
a) Using a graph paper, plot the points A (6, 4) and B (0, 4).
(i) Reflect A and B in the origin to get the images A' and B'.
(ii) Write the co-ordinates of A' and B'.
(iii) State the geometrical name for the figure ABA'B'.
(iv) Find its perimeter.

b) The shadow of a tower, when the angle of elevation of the sun is 45°, is found to be 10 m longer than when it was 60°. Find the height of the tower.

Section B (40 marks)
(Attempt any four questions)

Question 5 **[3+3+4=10]**

a) In the figure given below, AB is a diameter of the circle.If AE = BE and ∠ADC = 118°, find (i) ∠BDC (ii) ∠CAE.



b) Solve the inequation: $-3 \leq x - 2 \leq 9 - 2x$, $x \in W$.

c) Find the volume and the total surface area of a cone having slant height 17 cm and base diameter 30 cm. Take $\pi = 3.14$.

Question 6 **[3+3+4=10]**

a) Two squares have sides x cm and (x + 4) cm. The sum of their areas is 656 sq. cm.Express this as an algebraic equation and solve it to find the sides of the squares.

b) A letter of English alphabet is chosen at random. Determine the probability that the letter is a consonant.

c) Prove that : $\sec^4 A - \tan^4 A = 1 + 2\tan^2 A$.

Question 7 **[3+3+4=10]**

a) Show that (x – 2) is a factor of $3x^2 - x - 10$. Hence factories $3x^2 - x - 10$.

b) Point P (a, b) is reflected in the y-axis to P' (-3, 2).Write down value of a and b.
P" is the image of P when reflected in the x- axis. Write down the co-ordinates P".

c) Find the mean of the following distribution using step deviation method:

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of students	5	3	12	2	8	7	13	12	8	10

Question 8 **[3+3+4=10]**

a) If $A = \begin{bmatrix} 1 & 3 \\ -2 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 2 & -4 \\ 0 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ then find the value of $A + BC$.

b) A man has a Recurring Deposit Account in a bank for 3½ years. If the rate of interest is 12% per annum and the man gets ₹ 10,206 on maturity, find the value of monthly installments.

c) Solve the equation by using quadratic formula and give your answer correct to 2 decimal places: $2x^2 - x - 3 = 0$.

Question 9 **[3+3+4=10]**

a) The mean of 20 numbers is 18. If each of the numbers first multiplied by 2 and then increased by 3, then find the mean of new set of 20 numbers.
b) Show that :$(\sec A - \cos A)(\sec A + \cos A) = \sin^2 A + \tan^2 A$
c) The height and the radius of the base of a cylinder are in the ratio 3:1. If its volume is 1029π cm^3; find its total surface area.

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

a) The diameters of two cones are equal. If their slant heights are in the ratio 5:4, find the ratio of their curved surface areas.
b) A box contains 7 red balls, 8 green balls and 5 white balls. A ball is drawn at random from the box. Find the probability that the ball is:(i) white(ii) neither red nor white.
c) The angle of elevation of the top of a tower is observed to be 60°. At a point, 30 m vertically above the first point of observation, the elevation is found to be 45°. Find:

   (i) the height of the tower,

   (ii) its horizontal distance from the points of observation.

Question 11 **[3+3+4=10]**

a) If the volumes of two cones are in the ratio of 1 : 4 and their diameter are in the ratio of 4:5, find the ratio of their heights.

b) P and Q have co-ordinates (-2, 3) and (5, 4) respectively. Reflect P in the x-axis to P' and Q in the y-axis to Q'. State the co-ordinates of P' and Q'. Also, find the co- ordinate of mid point of line segment P'Q'.

c) If 3 is the root of the quadratic equation, $x^2 - x + k = 0$, find the value of p so that the roots of the equations $x^2 + k (2x + k + 2) + p = 0$ are equal.

[Internal Assessment = 20 Marks]