## PAWAR PUBLIC SCHOOL, BHANDUP.

| Class | Subject | Exam | Marks | Date | Duration | No. of printed sides |
|---|---|---|---|---|---|---|
| X | Mathematics | Prelim 2 | 80 | 07 .01.19 | 2 hrs. | 4 |

*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 the Paper is the time allotted 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 any essential working will result in loss of marks.*
*The intended marks for questions or parts of the questions are given in the brackets [ ].*
*Geometrical figures in the Paper are not drawn to scale.*

### Section A(40 marks)
*Attempt all the questions from this section*

**Question 1**

(a) Mr. Kamath gets ₹6455 at the end of one year at the rate of 14% per annum in a recurring deposit account. Find the monthly instalment. [3]

(b) Using remainder theorem show that $(x-2)$ is a factor of $3x^3 + 2x^2 - 19x + 6$. Hence factorise the given expression completely. [3]

(c) $A = \{x : 11x - 5 > 7x + 3, x \in R\}$ and $B = \{x : 18x - 9 \le 15 + 12x, x \in R\}$ Find the range of set $A \cap B$ and represent it on a number line. [4]

**Question 2**

(a) Solve the following equation. Give your answer correct upto one decimal place: [3]
$$2x - \frac{1}{x} = 7$$

(b) A dividend of 9% was declared on ₹100 shares selling at a certain price. If the rate of return is 7.5% calculate: [3]
    (i) the market value of each share
    (ii) the amount to be invested to obtain an annual income of ₹1260.

(c) A pair of dice is rolled. Find the probability of getting [4]
    (i) doublets
    (ii) sum is atleast 10
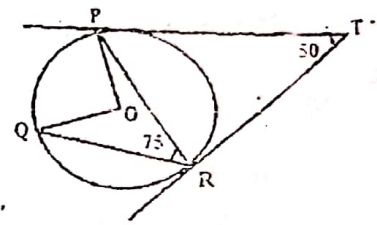    (iii) sum is atmost 5
    (iv) sum is multiple of 5

**Question 3**

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

(b) Prove that : $\sin\theta(1 + \tan\theta) + \cos\theta(1 + \cot\theta) = cosec\,\theta + \sec\theta$ [3]

(c) Find three numbers in G.P whose product is 216 and the sum of their products in pairs is 156. [4]

(19)

## Question 4

(a) In the adjoining figure TP and TR are the tangents to the circle with centre O. If $\angle PRQ = 75^0$ and $\angle PTR = 50^0$, calculate $\angle POQ$, $\angle TPR$ and $\angle QPR$. **[3]**

(b) The sum of $5^{th}$ and $9^{th}$ terms of an A.P is 72 and the sum of $7^{th}$ and $12^{th}$ terms is 97. Find the A.P. **[3]**

(c) Use graph paper for this question **[4]**
   (i) Plot the points A( 3, 5) and B(-2, -4). (Use 1cm = 1 uint on both axes)
   (ii) A' is image of A when reflected in the x-axis. Write down the coordinate of A' and plot it on the graph paper.
   (iii) B' is image of B when reflected in the y-axis followed by reflection in the origin. Write down the coordinate of B' and plot it on the graph paper.
   (iv) Write down the geometrical name of the figure AA'BB'.
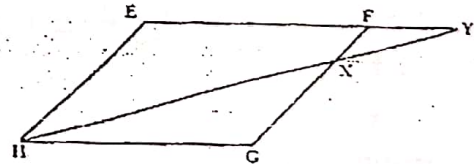   (v) Name two invariant points under reflection in x –axis.

## Section B (40 marks)
*Attempt any four questions from this section*

## Question 5

(a) Given $A = \begin{bmatrix} 2 & -1 \\ 2 & 6 \end{bmatrix}$, $B = \begin{bmatrix} -3 & 2 \\ 4 & 0 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 3 \\ 0 & -4 \end{bmatrix}$, find matrix D such that $A + 2D = BC + 5I$, where I is identity matrix of order 2 x 2. **[3]**

(b) In the figure given below, EFGH is a parallelogram. X is a point on FG such that FX : XG = 1:2 HX produced meets EF produced at Y. Given the area of triangle GXY = 10 cm². Calculate: **[3]**
   (i) area of triangle GHX
   (ii) area of parallelogram EFGH.

(c) Calculate the mean, the median and the mode of the following distribution: **[4]**

| Age (in years) | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|
| No. of Students | 2 | 3 | 5 | 6 | 4 | 3 | 2 |

## Question 6

(a) The distance by road between two towns, A and B is 216 km and by rail it is 208 km. A car travels at a speed of y km/h and the train travels at a speed which is 16 km/h faster than the car. If the train takes 2 hours less than the car to reach town B, find the speed of the train. **[3]**

(b) Find the mode of the following distribution by drawing a histogram. **[3]**

| Mid value | 5 | 15 | 25 | 35 | 45 | 55 | 65 |
|---|---|---|---|---|---|---|---|
| Frequency | 20 | 12 | 8 | 24 | 16 | 8 | 12 |

(c) On graph paper taking scale 1cm = 1 unit  [4]
   (i)   Plot the points A(2, 1), B(3, 7) and C(7, 3).
   (ii)  Construct locus of points equidistant from B and C.
   (iii) Construct the locus of points at a distance of 5cm from A.
   (iv)  Locate the point P such that PB = PC and PA = 5cm.
   (v)   Write the coordinate of P.

## Question 7

(a) A vessel is in the form of an inverted cone. Its height is 11cm and the radius of its top,  [3]
   which is open, is 2.5 cm. It is filled with water upto the rim. When some lead shots,
   each of which is a sphere of radius 0.25cm, are dropped into the vessel, two fifths of
   the water flows out. Find the number of lead shots dropped into the vessel.

(b) Find the value of 'a' for which the following points A(a, 3), B(2, 1) and C(5, a) are  [3]
   collinear. Hence, find the equation of the line.

(c) Mrs Tina invested ₹ 8000 in 7% ₹100 shares at ₹80. After a year she sold these  [4]
   shares at ₹75 each and invested the proceeds (including her dividend) in 18% ₹25
   shares at ₹41. Find
   (i)   her dividend for the first year
   (ii)  her annual income in the second year
   (iii) the percentage increase in her return on her original investment.

## Question 8

(a) In what ratio does the point G on X-axis divide the line segment joining the points  [3]
   E(3,2) and F(4,-1)? Also find the coordinate of point G.

(b) Construct a regular hexagon of side 5 cm. Inscribe a circle in it.  [3]

(c) TF is the tower. The angle elevation of T from A is $x^0$ where  [4]

   $\tan x^0 = \dfrac{2}{5}$ and AF = 200m the angle elevation of T from B

   where AB = 80m is $y^0$. Calculate:
   (i)   the height of the tower TF
   (ii)  the measure of angle $y$
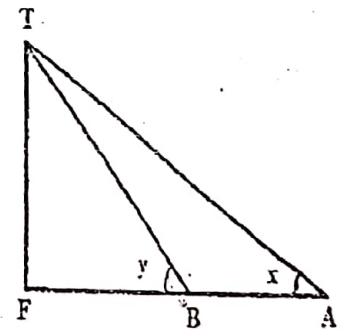
## Question 9

(a) A model of circular swimming pool was made to a scale of 1 : 2000.  [3]
   (i)   the circumference of the pool is 8800m. Find the radius of the model of the pool.
   (ii)  if the model can hold 5 cm³ water. Calculate the capacity of the pool in m³.

(b) Given : Matrix P = $\begin{bmatrix} 1 & 1 \\ 8 & 3 \end{bmatrix}$. Find matrix Q if, Q = P² -4P . Hence, solve for 'a' and 'b' if  [3]

   Q $\begin{bmatrix} a \\ b \end{bmatrix}$ = $\begin{bmatrix} 5 \\ 50 \end{bmatrix}$.

(c) Construct the "less than" ogive for the following distribution. [4]

| Score | Cumulative frequency |
|---|---|
| 1 – 10 | 2 |
| 11 – 20 | 6 |
| 21 – 30 | 13 |
| 31 – 40 | 29 |
| 41 – 50 | 63 |
| 51 – 60 | 102 |
| 61 – 70 | 126 |
| 71 – 80 | 139 |
| 81 – 90 | 148 |
| 91 - 100 | 150 |

(i) From your diagram estimate the median, the lower and upper quartiles.

## Question 10

(a) Prove the given identity $\cot^2 A\left(\dfrac{\sec A-1}{1+\sin A}\right)+\sec^2 A\left(\dfrac{\sin A-1}{1+\sec A}\right)=0$ [3]

(b) If 'b' is the mean proportion between 'a' and 'c' prove that $\dfrac{a^2-b^2+c^2}{a^{-2}-b^{-2}+c^{-2}}=b^4$ [3]

(c) How many cubic metres of earth must be dug out to make a well 28m deep and 2.8m in diameter. Also find the cost (nearest rupee) of plastering its inner surface at ₹4.50 per sq. metre. [4]

## Question 11

(a) The second term of a GP is $\dfrac{9}{4}$ and the 8th term is $\dfrac{16}{81}$, find the GP. [3]

(b) Write down the equation of the line whose gradient is 3/2 and which passes through P, where P divides the segment joining A(-2,6) and B(3,-4) in the ratio 2:3. [3]

(c) In the given figure O is the centre of the circle with AB as diameter. If $\angle AOE = 150^0$ and $\angle DAO = 51^0$. Calculate: [4]
   (i) $\angle CEB$ and $\angle CBE$
   (ii) If DE = 5cm, EC = 3cm BC = 4cm then find the length of radius.