HIRANANDANI FOUNDATION SCHOOL, THANE

Second Preliminary Examination – January 2019

Subject: Mathematics

Date: 10/01/19 **Max. Marks: 80**

Std.: X **Time : 2hrs. 30 mins**

Note: Attempt all questions from Section A and any four questions from 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 the loss of marks. The intended marks for questions are given in brackets[]. Graphs and Mathematical tables are provided.This question paper contains 4 printed pages.

Section A

(Attempt all the questions)

Question 1

a) Find the values of p so that the quadratic equation $(4+p)x^2 + (p+1)x + 1 = 0$ has equal roots. [3]

b) In an A.P., if $a = 1$, $a_n = 20$ and $S_n = 399$, then find the number of terms. [3]

c) All kings, jacks and diamonds have been removed from a pack of 52 playing cards and the remaining cards are well-shuffled. A card is drawn from the remaining cards. Find the probability that the card drawn is :
(i)a red queen (ii)a black card (iii) a face card [4]

Question 2

a) If a, b, c and d are in proportion, prove that:–

$$\frac{7a+4b}{7c+4d} = \frac{7a-4b}{7c-4d}$$ [3]

b) Find the equation of the line parallel to the line $3x - 5y = 7$ and passing through the point which divides the line segment joining the points (-3, 3) and (2, -7) in the ratio 2:3. [3]

c) If $\begin{bmatrix} a & 1 \\ 2 & 0 \end{bmatrix}\begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} -3 & b \\ c & 1 \end{bmatrix} - 5I$, find the values of a, b and c, where I is a 2x2 unit matrix. [4]

Question 3

a) Find the geometric progression whose 5^{th} term is 48 and 8^{th} term is 384. [3]

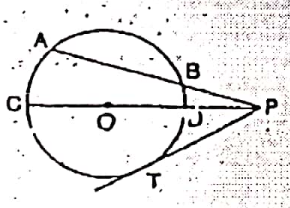
b) Determine whether the given quadratic equation has real root(s). If so, find the root(s).

$$z^2 + \frac{1}{2}z - 3 = 0$$ [3]

c) Use graph paper for this question. A point P is reflected to P' in the y-axis. The coordinates of its image are (-2, 3). [4]
(i)Find the coordinates of P.
(ii)Find the coordinates of the image P'' of P under reflection in the x-axis.
(iii)Find the coordinates of the image Q' of the point Q(-1, 2) under reflection in the line PP''.
(iv)Assign the special name to the figure PP'QQ'. Hence find its area.

Question 4

a) In the figure given below, chord AB and diameter CD of a circle with center O meet at P. PT is a tangent to the circle at T. If AP = 16cm, AB = 12cm and DP = 2cm, find the radius of the circle. Also find the length of PT. [3]



b) Elvin has a 4 year recurring deposit account in Union bank of India and deposits Rs 800 per month. If he gets Rs 48200 at the time of maturity, find [3]
(i)the total interest earned by him and (ii)the rate of interest

c) If $(x + 2)$ is a factor of $2x^3 + (2p + 1)x^2 + 7x - 6$, find the value of p. With this value of p, factorise the given expression completely. [4]

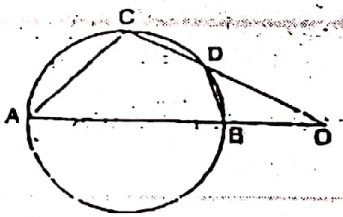
Section B

(Attempt any four questions)

Question 5

a) If $A = \begin{bmatrix} 2 & 4 \\ 2 & 1 \end{bmatrix}$, find $A^2 - 3A - 6I$, where I is the unit matrix of order 2. [3]

b) In the figure given below, chords AB and CD of a circle are produced to meet at O. Prove that triangles BOD and COA are similar. If CD = 2cm, OD = 6cm and BO = 3cm, find [3]
(i)length of AB
(ii)$ar(\Delta BOD) : ar(\Delta COA)$



c) Given : $A = \{x: 3 < 2x - 1 < 9, x \in R\}$ and $B = \{x: 11 \leq 3x + 2 \leq 23, x \in R\}$, where R is the set of real numbers. [4]
(i)Represent A and B on the number lines.
(ii)On the number line also mark $A \cap B$.

Question 6

a) Find the mode of the following distribution by drawing a histogram: [3]

Height(in cm)	30-40	40-50	50-60	60-70	70-80	80-90
No. of plants	4	3	8	11	6	2

b) Construct two tangents inclined at an angle of 60° to each other to a circle with radius 3cm. Measure the length of one of the tangents. [3]

c) Height of a solid cylinder is 10cm and diameter 8 cm. Two equal conical holes have been made from its both ends. If the diameter of the hole is 6cm and height 4cm, find the surface area of the remaining solid. [4]

Question 7

a) A model of a ship is made to a scale of 1:250. Find [3]
(i)the length of the ship in km, if the length of its model is 1.2m.
(ii)the area of the deck of the ship in sq. km, if the area of the deck of its model is $1.6m^2$.
(iii)the volume of its model in cubic meter, when the volume of the ship is 1 cubic km.

b) A solid sphere of radius 3cm is melted and recast into small spherical balls, each of diameter 0.6cm. Find the number of balls thus obtained. [3]

c) A man bought certain number of chairs for Rs 10,000. He kept one for his own use and sold the rest at the rate Rs 50 more than he gave for one chair, thus he made a profit of Rs 450. How many chairs did he buy? [4]

Question 8

a) If A(1, -2), B(3, 5) and C(-7, 0) are the vertices of a triangle ABC, find: [3]
(i)the coordinates of the centroid G of triangle ABC.
(ii)the equation of the line through G and parallel to BC.

b) Mr. Ramesh sold a certain number of Rs 20 shares paying 8% dividend at Rs 18 and invested the proceeds in Rs 10 shares, paying 12% dividend at 50% premium. If the change in his annual income is Rs 120, find the number of shares sold by him. [3]

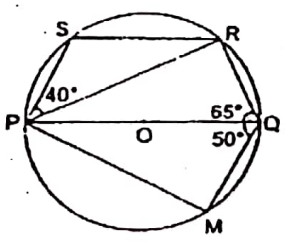
c) Find the mean of the following data by step deviation method. [4]

Marks Obtained	less than 10	less than 20	less than 30	less than 40	less than 50
No. of students	7	19	32	42	50

Question 9

a) In a G.P., the ratio of the sum of the first three terms to that of first six terms is 125 : 152. Find the common ratio of the G.P. [3]

b) In the figure given below, PQ is the diameter of a circle with center O. If $\angle PQR = 65°$, $\angle SPR = 40°$, $\angle PQM = 50°$; find $\angle$QPR, $\angle$PRS and $\angle$QPM. [3]



c) If $p(x) = x^4 - 2x^3 + 3x^2 - ax + b$ be a polynomial such that when it is divided by $x - 1$ and $x + 1$, the remainders are 5 and 19 respectively. Determine the remainder when $p(x)$ is divided by $x - 2$. [4]

Question 10

a) The marks obtained by the students of a class in Mathematics test are given in the following table:

Marks obtained	5	7	9	10	12	15	17	19
No. of students	8	4	7	3	9	7	4	2

Find : (i) mean marks (ii) median marks (iii) modal marks [3]

b) Prove : $\tan^2 A - \tan^2 B = \dfrac{\sin^2 A - \sin^2 B}{\cos^2 A \cos^2 B}$ [3]

c) A boy standing on the ground finds a bird flying at a distance of 100m from him at an elevation of 30. A girl standing on the roof of 20m high building finds the angle of elevation of the same bird to be 45. The boy and the girl are on the opposite sides of the bird. Find the distance between the bird and the girl, correct to the nearest cm. [4]

Question 11

a) 100 pupil in a school have heights as tabulated below: [6]

Height(in cm)	121-130	131-140	141-150	151-160	161-170	171-180
No. of pupil	12	16	30	20	14	8

Draw an ogive for the above data and estimate from the graph:

(i) the median

(ii) semi inter quartile range

(iii) Number of students whose height is less than or equal to 172cm.

b) Construct a triangle ABC in which AC = 5cm, BC = 7cm and AB = 6cm. [4]

(i)Mark D, the midpoint of AB.

(ii)Construct a circle which touches BC at C and passes through D.