SHREE CHANDULAL MANAVATI VIDYAMANDIR

SECOND PRELIMINARY EXAMINATION

2018-2019

MATHEMATICS

Date: 04 | 01 | 2019

STD: 10 Reading Time 15 Mins.

Marks: 80 Writing Time 2 ½ Hours.

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 questions or parts of questions are given in brackets [ ].

SECTION A (40 MARKS)

Answer ***all*** questions from this section

Question 1:

a. If $P = \begin{bmatrix} 1 & 2 \\ -3 & -4 \end{bmatrix}$, $Q = \begin{bmatrix} -1 & 0 \\ 4 & -5 \end{bmatrix}$, $R = \begin{bmatrix} 4 & 2 \\ -15 & 11 \end{bmatrix}$ find the value of scalar 'k' if $kQ = R - P$ (3)

b. Mr. Alvar deposits ₹ 300 per month for 27 months in a recurring deposit account. If at the time of maturity, he gets ₹ 8950.50, find the rate of interest. (3)

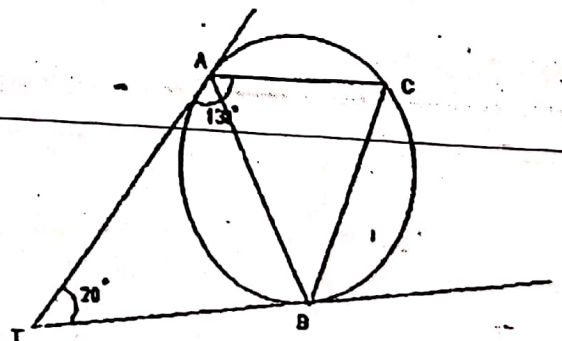
c. A glass cylinder, with diameter 14cm, has 20cm height. It contains water to a depth of 8cm. Five cones each of radius 3cm and height 7cm are dropped in it and completely immersed. How many litres of water more should be added to fill the glass? (4)

Question 2:

a. Cards marked with numbers 13, 14, 15.....,49 are placed in a box and mixed thoroughly. One card is drawn at random from the box. Find the probability that the number on the card is i) divisible by 5 ii) a number which is a perfect square. (3)

b. The sum of three numbers in A.P. is – 3 and the product is 8. Find the numbers. (3)

c. In the given figure, $\angle CAT = 130^0$ and $\angle ATB = 20^0$, calculate (4)
(i) $\angle ABT$
(ii) $\angle BAC$
(iii) $\angle BCA$
(iv) $\angle ABC$
AT and BT are tangents to the circle.



Question 3:

a. Solve the following quadratic equation by using the formula. (Give your answer correct to 3 significant figures)
$\sqrt{3}x^2 + 11x + 6\sqrt{3} = 0$ (3)

b. Prove that $\tan^4 A - \frac{1}{4} = \sec^4 A - 2\sec^2 A$ (3)

c. Find the mean of the following frequency distribution using short cut method. (4)

C.I	0 – 50	50 – 100	100–150	150–200	200–250	250–300
Frequency	4	8	16	13	6	3

Question 4:

a. Solve the following inequation and represent it on a number line. (3)

$$\frac{x}{2} + 3 \leq \frac{x}{3} + 4 < 4x - 7, \; x \in R$$

b. Find the equation of a line which passes through (3,4) and whose y-intercept is twice its x-intercept. (3)

c. If $(x^2 + 2x - 15)$ is a factor of $x^3 + ax^2 + bx - 30$, find the values of a and b. Hence find the remaining factor. (4)

SECTION B (40 MARKS)

Answer ***any 4*** questions from this section

Question 5:

a. If the roots of the equation $(a^2 + b^2)x^2 - 2(ac + bd)x + (c^2 + d^2) = 0$, are real and equal, prove that a, b, c, d are in proportion. (3)

b. Find the value of $81 + 27 + 9 + \ldots\ldots\ldots + \frac{1}{27}$ (3)

c. Manish invested a certain sum of money in 6% hundred rupees shares at ₹ 12 premium. When the price of the shares fell to ₹ 96, he sold out the shares and invested the proceeds in 10% ten rupee shares at ₹ 8. If the change in his income is ₹ 540, find the sum invested. (4)

Question 6:

a. AB and CD are two chords of a circle intersecting at a point P inside the circle. If PC = 3cm, CD = 7cm, PA = 6cm, determine AB. (3)

b. An observer 1.5m tall is 28.5m away from a chimney. The angle of elevation of the top of the chimney from his eye is 60°. What is the height of the chimney. (Give your answer correct to one place of decimal) (3)

c. Use a graph paper for this question:-

Plot X (0,4) Y (3,0) are the two vertices of a ΔXOY, where O is the origin.

i. Write down the co-ordinates of X_1, the reflection of X in the X-axis and Y_1, the reflection of Y in the Y axis.

ii. Assign a special name to the figure XYX_1Y_1

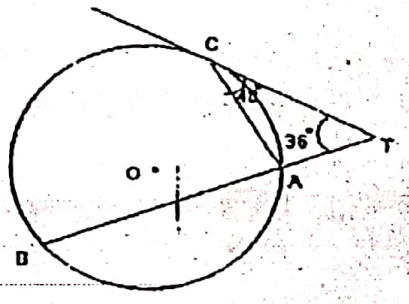
iii. Also find the area of the above figure. (4)

Question 7:

a. If "q" is the mean proportional between p & r, prove that:

$$p^2 - q^2 + r^2 = q^4\left(\frac{1}{p^2} - \frac{1}{q^2} + \frac{1}{r^2}\right)$$ (3)

b. A, B, C are three points on a circle. The tangent at C meets BA produced at T. Given that $\angle ATC = 36^0$ and $\angle ACT = 48^0$, calculate the angle subtended by AB at the centre. (3)



c. Construct a triangle ABC with BC = 6 cm, $\angle ABC = 120^0$ and AB = 5.5 cm. Find by construction, a point P such that $BC^2 = BP^2 + CP^2$ and equidistant from B and C. (4)

Question 8:

a. Prove that $\tan A + \sqrt{\frac{1 - \sin A}{1 + \sin A}} = \sec A$ (3)

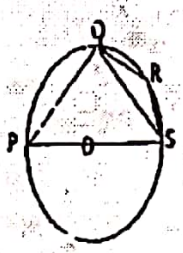
b. The line segment joining A(2, 3) and B(4, -5) is intersected by the x-axis at a point K. Write down the ordinate of the point. Hence find the ratio in which K divides AB and co-ordinates of the point K. (3)

c. Five years ago, a woman's age was the square of her son's age. Ten years hence, her age will be twice the age of her son. Find (i) the age of the son five years ago (ii) the present age of the woman. (4)

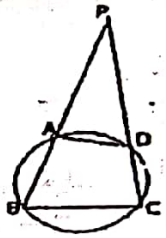
Question 9:

a. Find the slope ,inclination and y-intercept of the line AB if A (-3,-2) and B(1,2). (3)

b. In the figure, PS is a diameter of a circle with centre O. If angle QPS = 36° and QR = RS, find angle PSR (3)



c. From the given figure,
i)Prove that Δ PAD ~ Δ PCB
ii) If PA = 4cm,PC = 16cm,AD = 2cm,PD =3cm, find AB and BC
iii) Find area Δ PAD: area Δ PCB (4)



Question 10:

a. How many balls each of radius 1cm, can be made from a solid sphere of lead of radius 8cm ? (3)

b. A scale model of a building is made. The ground area of the model is one hundredth of the actual ground area. (3)
i) Calculate the length of the building if length of the model is 4m.
ii) If the volume of the building is 3000m^3, calculate the volume of the model in cm^3

c. Draw a circle of diameter 12 cm. Mark a point at a distance of 10 cm from the centre of the circle. Draw tangents to the given circle from this exterior point.
i) Measure the length of the tangent. ii) Calculate length of the tangent. Also find the difference between the measured and calculated lengths of the tangents. (4)

Question 11:

a. Find the equation of a line through P(5,-2) and perpendicular to the line 2x -7y =1.If (k,k+2) lies on that line, find the value of k. (4)

b. The following table shows the distribution of the heights of a group of factory workers: (6)

Height (cm)	150-155	155-160	160-165	165-170	170-175	175-180	180-185
No. of workers	6	12	18	20	13	8	6

i) Draw the cumulative frequency curve on a graph paper
Use 2 cm = 5 cm height on one axis and 2 cm = 10 workers on the other.
ii) From your graph, write down the median height in cm.
iii) How many workers have a height of above 178 cm?