VIBGYOR HIGH

Second Preliminary Examination

2019-2020

MATHEMATICS

Grade: X
Date : 13/01/2020

Max. Marks : 80
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.
- The intended marks for the questions or parts of questions are given alongside the questions.
- 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.
- Geometrical figures to be constructed wherever applicable.
- For geometry, figures are to be copied to the answer script.
- Mathematical tables are provided.
- This paper consists of 6 printed pages.

SECTION A (40 marks)

(Attempt all questions from this section)

Question 1

a) Sunita has cumulative time deposit account in a bank. She deposits ₹ 600 per month for 6 years. If at the end of the maturity period she gets ₹ 53712, find the rate of interest. [3]

b) Using Remainder Theorem, factorise:
$2x^3 + 9x^2 + 7x - 6$ completely. [3]

c) **For the AP 3, 7, 11 ..... 407 find**

i) The number of terms. [4]

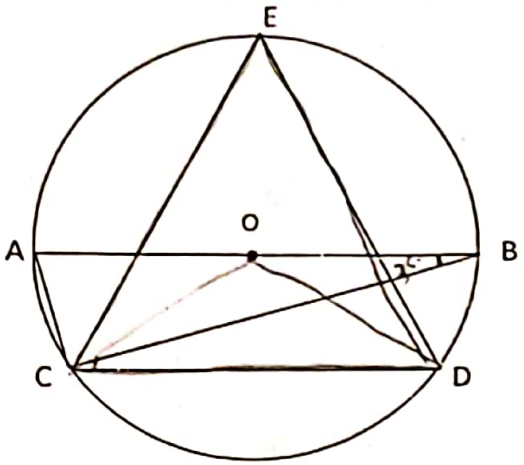
ii) The 20^{th} term from the end

Question 2

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

b) How much should a man invest in ₹ 50 shares selling at ₹ 60 to obtain an income of ₹ 450, if the rate of dividend is 10%? [3]

c) In the figure given below, O is the centre of the circle. Chord CD is parallel to the diameter AB. If $\angle ABC = 35°$, calculate $\angle CED$. [4]



Question 3

a) The slope of a line joining P(6,k) and Q(1-3k,3) is $\frac{1}{2}$.

Find:

i) The value of k

ii) Midpoint of PQ [3]

b) Prove that : $\frac{1}{\cos\theta+\sin\theta}+\frac{1}{\sin\theta-\cos\theta}=\frac{2\sin\theta}{1-2\cos^2\theta}$ [3]

c) The numbers 6, 8, 10, 12, 13 and x are arranged in the ascending order. If the mean of the observations is equal to the median, find the value of x. [4]

Question 4

a) If $M=\begin{bmatrix}1 & 2\\ 2 & 1\end{bmatrix}$ and I is the unit matrix of the same order as that of M, show that

$M^2 = 2M + 3I$ [3]

b) **Solve the inequation and represent on the number line**

$-3 + x \leq \frac{8x}{3} + 2 \leq \frac{14}{3} + 2x, \quad x \in W$ [3]

c) Draw a circle of radius 3cm. Take a point P at a distance of 5.5cm from the centre of the circle drawn. Draw two tangents PA and PB to the given circle. [4]

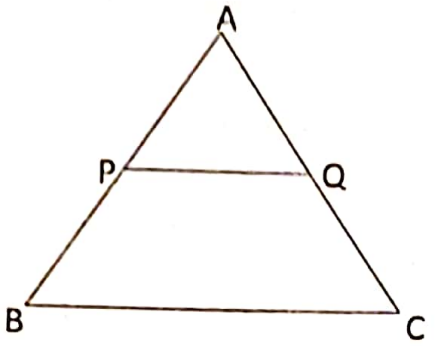
SECTION B (40 marks)

(Attempt any four questions from this section)

Question 5

a) ABC is a triangle and PQ is a straight line meeting AB at P and AC at Q. If AP = 1cm, PB = 3cm, AQ = 1.5cm and QC = 4.5cm, prove that:

$\text{Area } (\Delta APQ) = \frac{1}{16} \text{ Area } (\Delta ABC)$ [3]



b) Sunil spends ₹ 10 on first day, ₹ 20 on second day, ₹ 40 on the third day and so on. Find how much, in all, he will spend in 8 days. [3]

c) If $A = \begin{bmatrix} \sec 60° & \cos 90° \\ -3\tan 45° & \sin 90° \end{bmatrix}$ and $B = \begin{bmatrix} \cos 90° & \cot 45° \\ -4\sin 30° & 3\sin 90° \end{bmatrix}$, find

i) A^2

ii) BA [4]

Question 6

a) In a bag, tickets numbered from 1 to 20 are mixed together for lucky draw. When a ticket is drawn at random, what is the probability of getting a number which is:

i) A multiple of 3 or 7.

ii) Not a prime number.

iii) Between 3 and 8. [3]

b) Mr. Sharma went to watch a movie. He wanted to purchase a movie ticket for ₹ 90. As the ticket for ₹ 90 was not available, he purchased a ticket for ₹ 150 of the Gold class. How much extra GST did he pay for the ticket? (GST for ticket below ₹ 100 is 18% and GST for ticket above ₹ 100 is 28%) [3]

c) Using ruler and a compass:

i) Construct $\triangle ABC$ in which BC = 6.5cm, $\angle ABC = 60°$, AB = 5cm

ii) Construct a locus of points at a distance of 3.5cm equidistant from point A.

iii) Construct a locus of points equidistant from AC and BC.

iv) Mark two points X and Y which are at the distance of 3.5cm from A and also equidistant from AC and BC. [4]

Question 7

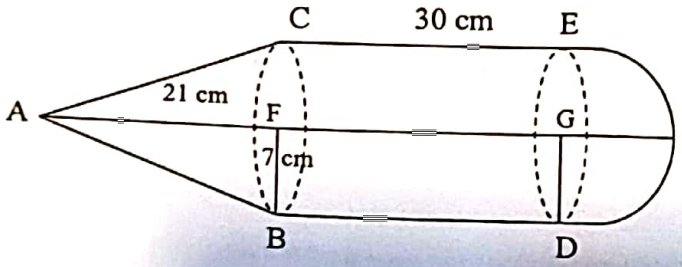
a) If $\frac{x}{b-c} = \frac{y}{c-a} = \frac{z}{a-b}$, prove that $ax + by + cz = 0$ [3]

b) Marks obtained by 45 students in mathematics aptitude test was recorded as follows: [3]

Marks	50-60	60-70	70-80	80-90	90-100
No. of Students	4	8	14	12	5

Draw a histogram for the above data using a graph paper and locate the mode.

c) In the diagram given below, if AF = 21cm, CE = 30cm, DG = 7cm and FB = 7cm, find the volume of the figure to the nearest whole number. [4]



Question 8

a) Solve for x using the quadratic formula. Write your answer correct to two significant figures.

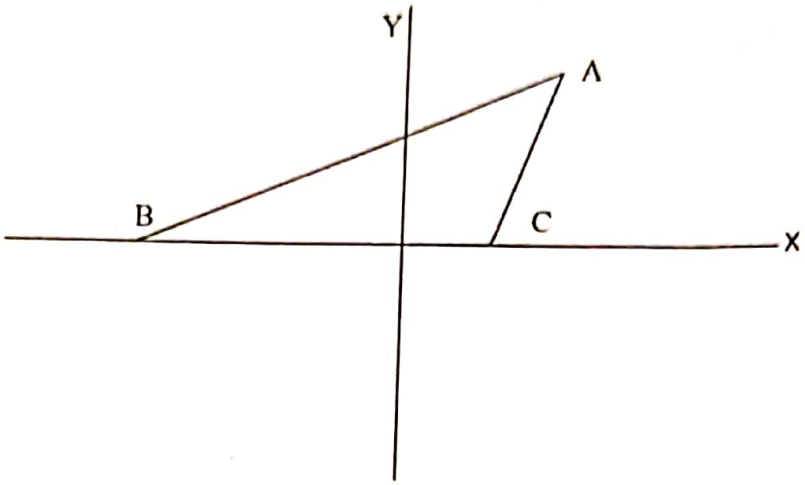
$(x-1)^2 - 3x + 4 = 0$ [3]

b) Find the sum of the first 35 terms of an A.P whose 2nd and the 7th term are 2 and 22 respectively. [3]

c) Using ruler and a compass only, construct a ΔPQR with $PQ = 6cm$, $PR = 6.5cm$ and $\angle QPR = 90°$. Hence inscribe a circle in ΔPQR. [4]

Question 9

a) In the diagram given below, equation of AB is $x - \sqrt{3}y + 1 = 0$ and equation of AC is $x - y - 2 = 0$. Write down the inclinations of the lines AB and AC made in the positive direction of the x-axis. Hence find $\angle BAC$. [3]



b) From the top of a cliff 92m high, the angle of depression of a buoy is 20°. Find the distance of the buoy from the foot of the cliff. [3]

c) Rajesh invested ₹ 24000 in 7%, ₹ 100 shares discounted at 20%. After one year, he sold these shares at ₹ 75 each and invested the proceeds (including his dividend) in 18%, ₹ 25 shares at 64% premium. Find:

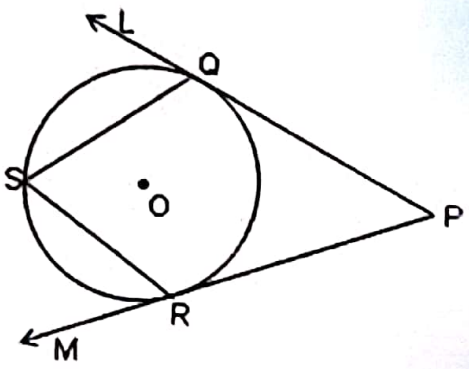
i) His gain or loss after one year.

ii) His annual income from the second investment.

iii) Percentage increase in return on his original investment. [4]

Question 10

a) In the given figure, PQL and PRM are two tangents to the circle with centre O at point Q and R respectively. If S is a point on the circle such that $\angle SQL = 50°$ and $\angle SRM = 60°$; find $\angle QOR$. [3]



b) A man bought a certain number of chairs for ₹ 10,000. He kept one for his own use and sold the rest at the rate of ₹ 50 more than the cost price. He made a profit of ₹ 450 on the whole transaction. Find the number of chairs bought by him. [3]

c) Using graph paper, plot the points A (2, 3), B (4, 5) and C (7, 2) of $\triangle ABC$.

i) Write down the coordinates of A', B', C', if $\triangle A'B'C'$ is the image of $\triangle ABC$ reflected in the X-axis.

ii) Mention the special name of the quadrilateral BCC'B' and find its area. [4]

Question 11

a) The lower window of a house is at a height of 2 m above the ground and its upper window is 4 m vertically above the lower window. At a certain instant, the angles of elevation of a balloon from these windows are observed to be 60° and 30° respectively. Find the height of the balloon above the ground. [4]

b) The following table shows the distribution of heights of a group of students.

Height (cm)	140-145	145-150	150-155	155-160	160-165	165-170	170-175
No of students	8	12	18	22	26	10	4

Draw an Ogive for the above data and from it determine:

i) The inter-quartile range

ii) The median

iii) The number of students whose height is less than 148 cm. [6]

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