**FIRST TERM EXAMINATION 2020-21**

**GRADE X** **MATHEMATICS** **MARKS: 80**

**TIME: 2 ½ Hrs.**

## SECTION - A

**Attempt all the questions** **(4x10 =40)**

**Question 1**

a. ₹480 is divided equally among $x$ children. If the number of children were 20 more, then each would have got ₹12 less. find$x$. (4)

b. The sum of $4^{th}$ and $8^{th}$ term of an AP is 24 and the sum of $6^{th}$ and $10^{th}$ terms is 34. Find the first term and common difference. (4)

c. Solve: $2x - \frac{3}{x} = 5$ without using formula (2)

**Question 2**

a. Find the value of 'k' if (x-2) is a factor of $x^3 + 2x^2 - kx+10$. Hence determine whether (x+5) is also a factor. (3)

b. The radius and the slant height of a cone are in the ratio 4:7. If its Curved surface area is $792cm^2$, find its radius. (use $\prod = \frac{22}{7}$) (3)

c. Mohan has a recurring deposit account in a bank for 2 years at 6% per annum simple interest. If he gets ₹ 1200 as interest at the time of maturity, find: (i) the monthly installment
(ii) The amount of maturity (4)

**Question 3**

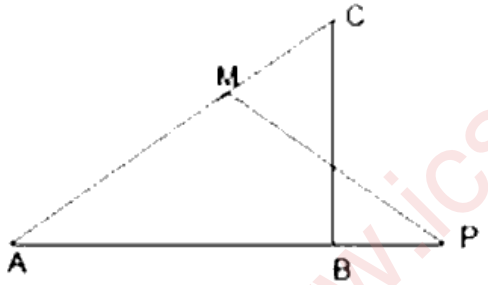
a. If b is the mean proportional between a and c, prove that ( ab +bc ) is the mean proportional between $(a^2 + b^2)$and $( b^2 + c^2)$ (3)

b. Evaluate without using Trigonometrical tables:
$2(\frac{\tan 35°}{\cot 55°})^2 + (\frac{\cot 55°}{\tan 35°})^2 - 3(\frac{\sec 40°}{cosec\ 50°})$ (3)

c. Two pipes running together can fill a cistern in $2\frac{8}{11}$ minutes. If one pipe takes one minute more than the other to fill the cistern, find the time in which each pipe will fill the cistern. (4)

**Question 4**

a. In the given figure ΔABC and ΔAMP are right angled at B and M respectively. Given AC=10cm, AP = 15cm and PM = 12cm.
   (i) Prove that ΔABC ~ΔAMP
   (ii) Find AB and BC (4)




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' (3)

c. Prove that $\frac{tan^2\theta}{(\sec\theta-1)^2} = \frac{1+cos\theta}{1-cos\theta}$ (3)

**SECTION - B**

**Answer any 4 questions (4x10 =40)**

**Question 5**

a. Ashima has a recurring deposit account in a bank for 5 years at 9% p.a. At the time of maturity, she gets ₹51,607.50. Find the monthly installment. (4)
b. In an AP the first term is 8, nth term is 33 and the sum of first n terms is 123. Find n and d. (3)
c. A solid cone of radius 5 cm and height 8 cm is melted and made into small spheres of radius 0.5cm. Find the number of spheres formed. (3)

## Question 6

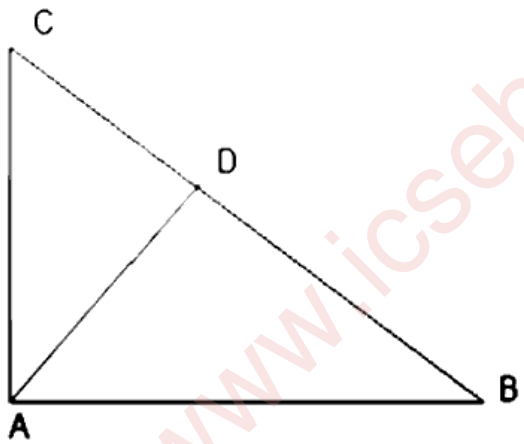
a. Prove that $\frac{sin\theta - 2sin^3\theta}{2cos^3\theta - cos\theta}$ = tan Θ (3)

b. In the adjoining figure, ABC is a right angled triangle with ∠ BAC = 90° and AD is perpendicular to BC.

(i) Prove that ΔADB ~ΔCDA

(ii) If BD = 18 cm and CD = 8 cm, find AD.

(iii) Find the ratio of the area of ΔADB and area of ΔCDA (4)




c. If x, y, z are in continued proportion, prove that $\frac{(x+y)^2}{(y+z)^2} = \frac{x}{z}$ (3)

## Question 7

a. Using the remainder theorem, factorise the polynomial completely: $3x^3 + 2x^2 - 19x + 6$ (4)

b. Without solving the following quadratic equation, find 'm' for which the given equation has real and equal roots: $x^2 + 2(m-1)x + (m+5) = 0$ (3)

c. The volume of a cylinder is 448∏ $cm^3$ and height 7cm. find the curved surface area and total surface area. (3)

## Question 8

a. In ΔABC, DE ||BC. If AD =x-5, DB = 3x -19, AE=3 and EC = x-3, find x. (3)

b. What must be added to the numbers 6, 10, 14 and 22 to make them in proportion? (3)

c. Solve $4x^2 - 5x$-3 =0 for x and give your answer correct to two decimal places. (4)

**Question 9**

a. Find the remainder when f(x ) $=2x^3 - 3x^2 - 4x - 5$ is divided by (2x+1). (3)

b. If 7 times of 7th term of an AP is equal to 11 times of its 11th term, then show that its 18th term is zero. (3)

c. Solve : $2(\frac{x}{1+x})^2 - 5\left(\frac{x}{1+x}\right) + 2 = 0$ (4)

**Question 10**

a. If x = $\frac{\sqrt{a+1}+\sqrt{a-1}}{\sqrt{a+1}-\sqrt{a-1}}$, using properties show that $x^2 - 2ax+1=0$ (4)

b. Form a quadratic equation whose roots are 2 and -5 (2)

c. David opened a recurring deposit account in a bank and deposited ₹300 per month for two years. If he received ₹7725 at the time of maturity find the rate of interest per annum. (4)

**Question 11**

a. A toy is in the form of a cone mounted on a hemisphere of radius 3.5cm.The total height of the toy is 15.5cm. Find the total surface area. (4)

b. Prove that ( cosec A – Sin A)( Sec A – Cos A)$sec^2 A$ = tan A (3)

c. The sum of two numbers is 8 and the sum of their squares is 34. Find the numbers. (3)