

# MAR THOMA RESIDENTIAL SCHOOL, THIRUVALLA

Second Model Examination 2019 – 2020

Mathematics

Class – X

Time :  $2\frac{1}{2}$  hrs

Mark : 80

Section A (40 Marks)

Attempt all questions from this section

## Question 1

- a) When  $x^3+3x^2 - kx + 4$  is divided by  $x-2$ , the remainder is  $k$ , find the value of  $k$ . (3)
- b) Mohan bought an article for Rs 8000 and spent Rs 2000 for transportation. He marked the article at Rs 12000 and sold it to a customer. If the rate of GST is 12% on this item. Find (i) the customer's price. (ii) Mohan's profit percent. (3)
- c) Find the sum of all multiples of 7 lying between 500 and 900. (4)

## Question 2

- a)  $A = \{x: 0 < x+1 \leq 6, \in \mathbb{R}\}$  and  $B = \{x: -2 < x+2 \leq 5, x \in \mathbb{R}\}$   
i. Represent A and B on number lines.  
ii. On the number line also mark  $A \cap B$  (3)
- b) Prove that  $(1 + \tan \theta)^2 + (1 + \cot \theta)^2 = (\sec \theta + \operatorname{cosec} \theta)^2$  (3)
- c) A man has 40 shares of nominal value Rs 100 and he decides to sell them when they are at a premium of 50%. He invests the proceeds in shares of nominal value of Rs 75 quoted at 20% discount paying 25% dividend annually. Calculate (i) the sale proceeds (ii) the number of shares he buys and (iii) the annual dividend from these shares. (4)

## Question 3

- a) Find the  $2 \times 2$  matrix X which satisfies the equation (3)

$$\begin{bmatrix} 3 & 7 \\ 2 & 4 \end{bmatrix} \times \begin{bmatrix} 0 & 2 \\ 5 & 3 \end{bmatrix} + 2X = \begin{bmatrix} 1 & -5 \\ -4 & 6 \end{bmatrix}$$

- b) A right circular cone is 3.6cm high and the radius of its base is 1.6 cm. It is melted and recast into a right circular cone with radius of its base as 1.2 cm, find the height (2)

- c) The arithmetic mean of the following data is 14. Find the value of P. (4)

x :	5	10	15	20	25
f :	7	P	8	4	5

#### Question 4

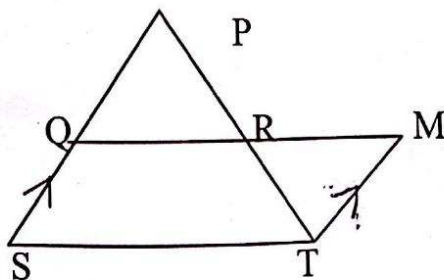
- a) A lady opened a recurring deposit account with a bank for  $3\frac{1}{2}$  years. If the rate of interest is 10% per annum and the bank pays her Rs 9905 on maturity. Find how much did she deposit every month. (3)
- b) If -5 is a root of the quadratic equation  $2x^2 + px - 15 = 0$  and the quadratic equation  $P(x^2 + x) + k = 0$  has equal roots, find the value of k. (3)
- c) Use a graph paper to answer the following questions. (4)  
 (Take 1 cm = 1 unit on both axes)
- (i) Plot A (4, 4), B (4, -6) and (8, 0)
- (ii) Reflect ABC on the y axis and name it as A' B' C'
- (iii) Write the coordinates of the images A', B' and C'.
- (iv) Give a geometrical name for the figure AA'C'B' BC.

#### Section B (40 Marks)

Attempt any four questions from this section

#### Question 5

- (a) If  $(x - 9) : (3x + 6)$  is the duplicate ratio of 4 : 9, find the value of x. (3)
- (b) In the adjoining figure, PST and TMR are two triangles where SP is parallel to TM and  $PR : PT = 5:8$  (3)

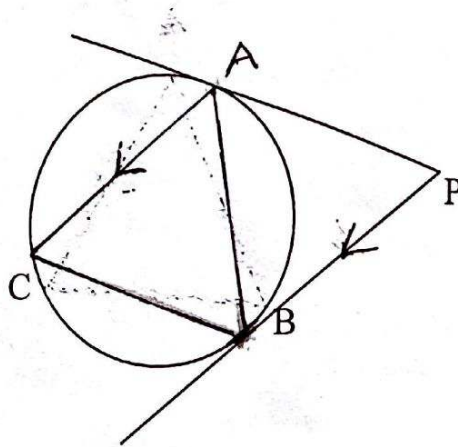


- (i) Prove that  $\Delta PQR \sim \Delta TMR$
- (ii) Find PQ if  $TM = 6\text{cm}$
- (iii) If QR is parallel to ST, find area of  $\Delta PQR$  : of  $\Delta PST$

- (c) A toy is in the shape of a right circular cylinder with a hemisphere on one end and a cone on the other. The height and radius of the cylindrical part are 13cm and 5cm respectively. The radii of the hemispherical and conical parts are the same as that of the cylindrical part. Calculate the surface area of the toy if the height of the conical part is 12cm. (4)

### Question 6

- (a) Find the mean, mode and median of the following data 25, 27, 19, 29, 21, 23, 25, 30, 28, 20 (3)
- (b) PA and PB are two tangents of a circle  $\angle APB = 50^\circ$  and chord AC is drawn parallel to PB. Find the angles of  $\Delta ABC$  (3)



- (c) If the  $n$ th terms of two A. P.'s 9, 7, 5, ..... and 24, 21, 18, ..... are the same, then find the value of  $n$ . Also that term. (4)

### Question 7

- (a) Find the equation of the perpendicular bisector of AB, where the co-ordinates of A and B are (6, 5) and (2, 1). Also find the value of K if  $(-2, -k)$  lies on it. (3)
- (b) Factorise  $x^3 - 7x + 6$ , using factor theorem (3)
- (c) Construct a triangle ABC in which  $AB=5$  cm,  $BC = 8$  cm and  $CA=7$  cm. Construct the circle which passes through A and B and which has BC as a tangent. (4)

### Question 8

- (a) If  $A = \begin{pmatrix} 3 & 2 \\ x & 4 \end{pmatrix}$  and  $B = \begin{pmatrix} 1 & 2 \\ x & 2 \end{pmatrix}$ , Find the value of  $x$  if  $A^2 = 7B$  (3)
- (b) In  $\Delta ABC$ ,  $\angle B = 90^\circ$ ,  $AB=7$  cm and  $BC = 24$  cm Find the radius of its incircle. (3)
- (c) A party of tourists booked a room in a hotel for Rs 1200. Three of the members failed to pay, as a result others had to pay Rs 20 more (each). How many tourists were there (4)

### Question 9

(3)

(a) Prove that  $\frac{1 + \sin^2 \theta \cdot \sec^2 \theta}{\sqrt{1 + \cos^2 \theta \cdot \operatorname{cosec}^2 \theta}} = \tan \theta$

- (b) All the red face cards are removed from a pack of 52 playing cards. The remaining cards are well shuffled and then a card is drawn at random. Find the probability of getting a (i) face card (ii) red card (iii) queen. (3)
- (c) Ram buys a washing machine from a wholesaler for Rs 30000. He marks the price of the washing machine 10% above the cost price and sell it to Deepu at a discount of 5% on the marked price, GST is 12%. Find (i) the marked price of the washing machine (ii) the amount which Deepu pays for washing machine. (iii) the amount of tax paid by Mohan to the central government. *The sale is interstate.* (4)

### Question 10

- (a) Use graph paper for this question.

The weights of 40 men are given below

Weight (in kg)	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120
No. of men	3	5	9	12	5	4	2

Draw the ogive and hence estimate:

- The median weight
  - The number of men weights 85 kg or less. (6)
  - The upper quartile.
- (b) Using properties of proportion solve for x, given  $\frac{(3x-4)^3 - (x+1)^3}{(3x-4)^3 + (x+1)^3} = \frac{61}{189}$  (4)

### Question 11

- (a) The first term of a G.P. is -3 and the square of the second term is equal to its fourth term. Find the seventh term of the G.P. (3)
- (b) Solve for x:  $2(x-1)(x-5) = 5$ . Give your answer correct to two decimal places (3)
- (c) The lamp posts are of equal height. A boy standing midway between them observes the elevation of the either post to be  $40^\circ$ . After walking 15m towards one of them he observes the elevation of the top of that post to be  $65^\circ$ . Find the height of the posts and the distance between them. (4)