Mar Thoma Residential School, Tiruvalla

Std X — *I Terminal Examination* 2017-'18 — Marks : 80

Mathematics — Time:2 ½ hrs

Section A (Answer all Questions)

Question 1

a) If the n^{th} term of a sequence is given by $t_n = 3 + 4n$, find the sum of the first 15 terms of the sequence.

b) A man deposits ₹ 4,000 per month in a recurring deposit account for 3 years at 8 % p.a. Find (i) interest earned in 3 years. (ii) matured value

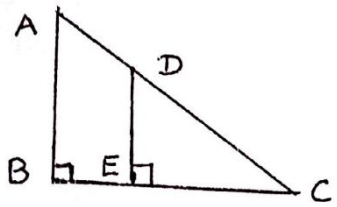
c) Solve and graph it on a number line $-3 + x \le \frac{8x+2}{3} \le \frac{14}{3} + 2x, \quad x \in I$

Question 2

a) If $\frac{7a-5b}{7c-5d} = \frac{7a+5b}{7c+5d}$, Prove that $\frac{a}{b} = \frac{c}{d}$

b) Show that $2x + 7$ is a factor of $2x^3 + 5x^2 - 11x - 14$. Hence factorise the expression completely.

c)



In the figure if AB = 9cm, DE = 3 cm, and AC = 24 cm. Calculate AD.

Question 3

a) If $2\begin{bmatrix} 3 & x \\ 0 & 1 \end{bmatrix} + 3\begin{bmatrix} 1 & 3 \\ y & 2 \end{bmatrix} = \begin{bmatrix} z & -7 \\ 15 & 8 \end{bmatrix}$ find the values of x, y and z.

b) How many terms of the G.P 3, $^3/_2$, $^3/_4$, ... are needed to give the sum $^{3069}/_{512}$?

c) Solve and correct to two significant figures $2(x^2 + 1) = 5x$

Question 4

a) If a, b, c are in continued proportion. Show that $\frac{a^2 + ab + b^2}{a^2 + ac + c^2} = \frac{b^2}{b^2 - bc + c^2}$

b) A shopkeeper raises the price of an article by 6 % above the listed price and charges a sales tax of 10 %. Find the list price of the article, if the customer has to pay ₹6996 for the article.

c) In a flower bed there are 23 rose plants in the first row, 21 in the second, 19 in the third and so on. There are 5 rose plants in the last row. How many roses are there in the flower bed ?

Section B

(Answer any 4 questions only)

Question 5

a) A shopkeeper buys a heater at 25 % discount from the wholesaler. The printed price of the heater is ₹6,000 and rate of VAT is 8 %. The shop-keeper sells it at the printed price and charges VAT at the same rate. Find: (i) Price at which heater can be bought (ii) VAT paid by the shopkeeper. [3]

b) Find the sum of all natural numbers below 500 which are divisible by 8. [4]

c) Given $\begin{bmatrix} 8 & -2 \\ 1 & 4 \end{bmatrix} X = \begin{bmatrix} 12 \\ 10 \end{bmatrix}$

(i) Write the order of matrix X.

(ii) Find matrix X. [3]

Question 6

a) $P = \{ x : 5 < 2x - 1 \leq 11, \ x \in R \}$ $Q = \{ x : -1 \leq 3 + 4x < 23, \ x \in I \}$

Represent P and Q on a number line. Write down the elements of $P \cap Q$.

b) A company with 4,000 shares of nominal value of ₹ 110 each declares an annual dividend of 15 %. Calculate (i) the total amount of dividendpaid by the company (ii) the annual income of a man who holds 88 shares in the company (iii) if he received only 10 % on his investment, find the price he paid for each share.

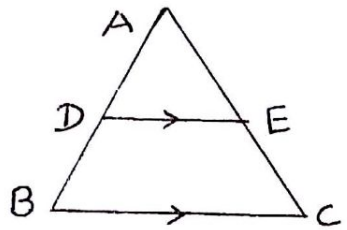
c) Find two numbers whose mean proportional is 16 and the third proportional is 128.

Question 7

a) Find the sum of first 22 terms of an A.P in which d = 7 and 22nd term is 149.

b) A trader buys a certain number of articles for ₹ 600. If the cost per article were ₹ 5 more, the number of articles that were bought for ₹ 600 would have been 4 less. Find the number of articles .

c)



In the given figure DE // BC.

(i) Prove that Δ ADE and Δ ABC are similar

(ii) Given that AD = ½ BD, Calculate DE, if BC = 4.5 cm

Question 8

a) A man needs ₹ 16,509 after 36 months. How much money he should invest per month in a recurring deposit scheme to get the required amount, when the rate of interest is 9.5 % per annum ?

b) Find the value of P if the roots of the equation $Px^2 - (2P - 2)x + P = 0$ has equal real roots.

c) If $A = \begin{bmatrix} 1 & 3 \\ 3 & 4 \end{bmatrix}$ $B = \begin{bmatrix} -2 & 1 \\ -3 & 2 \end{bmatrix}$ and $A^2 - 5B^2 = 5C$. find matrix C.

Question 9

a) Solve the quadratic equation and give the answer correct to two significant figures. $4x^2 - 7x + 2 = 0$

b) A Square is drawn by joining mid-points of sides of a square having side 16 cm. Similarly, a third square is drawn inside the 2nd square and thisprocess continues till the side of last square is 1 cm. Determine the sum of area of all squares.

c) If $x^2 + 3x + 2$ is a factor of $3x^3 + x^2 - ax - b$ find a and b.