THE CATHEDRAL & JOHN CONNON SCHOOL
Preliminary Examinations 2007-2008
CLASS X

MATHEMATICS

Time: **2½ hours** DATE: 14-01-2008 Maximum Marks: **80**

Attempt ALL questions from Section A and any FOUR questions from Section B. All working including rough work must be clearly shown on the same sheet as the rest of the answer. You will not be allowed to write during the first 15 minutes. This time is to be used for reading the question paper. This question paper contains seven pages.

SECTION A
[40 marks]
Attempt ALL questions.

Q 1:

(a) Using factor theorem, find the values of the constants *'a'* and *'b'* if $(x+1)$ is a factor of the expression $3x^3 + ax^2 + bx - 5$. When this expression is divided by $(x-1)$ it leaves a remainder 2. (3)

(b) What number must be added to each of the numbers 6, 15, 20 and 43 to make them proportional? (3)

(c) A manufacturer of furniture sells a sofa set to a retailer for Rs.23,000. The retailer in turn sells the sofa set to a customer for Rs. 29,500. Find the VAT rate as percent, if the retailer pays Rs. 520 as VAT. (4)

Q 2:

(a) Mr. Nair gets Rs.6455 at the end of one year at the rate of 14% per annum in a recurring deposit account. Find the monthly instalment. (3)

(b) A cow is tied with a rope of 3.5m in length to one corner of a square plot of sides 16m for grazing the grass. Find the area of the portion, which the cow cannot graze correct to two places of decimals. (3)

A 19

continued on page 2

(c) A dividend of 9% was declared on Rs.100 shares selling at a certain price. If the rate of return is 7½ %, calculate
(i) the market value of the share
(ii) the amount to be invested to obtain an annual dividend of Rs. 630. (4)

Q. 3:

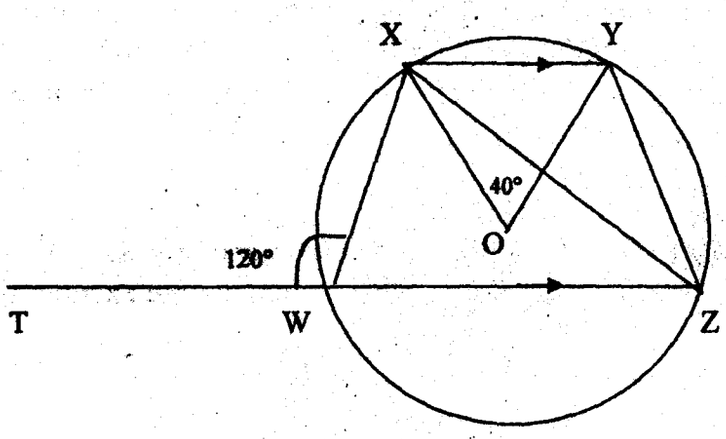
(a) Use graph paper for this question taking 10 small units = 1 cm. The points A (–2, 3), B (1, 5) and C (3, 4) are the vertices of a triangle ABC.
(i) Δ A′ B′ C′ is the image of Δ ABC when reflected in $y = 1$. Find the coordinates of A′, B′ and C′.
(ii) Δ A″ B″ C″ is the image of Δ A′ B′ C′ when reflected in the y axis. Write down the coordinates of A″, B″ and C″. (3)

(b) Solve the inequation and plot on a number line:
$-20 \leq 2x - 24 \leq 16 - 3x, \quad x \in W$ (3)

(c) Find the H.C.F. and L.C.M. of the following:
$2x^2 - 11x - 6, \quad 2x^3 - 432, \quad x^2 - 36$ (4)

Q 4:

(a) In the figure below, O is the centre of the circle. ∠ XOY = 40°, ∠ TWX= 120° and XY is parallel to TZ. Find giving reasons
(i) ∠ XZY (ii) ∠ YXZ (iii) ∠ TZY (3)



Continued on page 3

A 2

(b) Without using Trigonometric tables, evaluate the following:

$$3\,\frac{\cos 47^\circ}{\sin 43^\circ} - \frac{\cot 31^\circ}{\tan 59^\circ} - \sqrt{2}\sin 45^\circ$$ (3)

(c) A man borrowed a sum of money and agrees to pay off by paying Rs. 3150 at the end of the first year and Rs. 4410 at the end of the second year. Find the sum borrowed if the rate of interest is 5% compounded annually. (4)

SECTION B

[40 Marks]

Attempt any FOUR questions

Q 5:

(a) Solve using properties of proportion:

$$\frac{x^2 - 5x + 20}{5x - 20} = \frac{x^2 + 3x - 5}{5 - 3x}$$ (3)

(b) A solid metallic cone of radius 14 cm and height 21cm is melted down and recast into spheres of radius 3.5 cm. Calculate the number of spheres that can be made. Take $\pi = \frac{22}{7}$ (3)

(c) Draw a circle of radius 4 cm. Draw tangents from an external point P such that the angle between the tangents is 30°. Draw another circle passing through P and touching the original circle. Use ruler and compass only for the construction. (4)

Q 6:

(a) During the financial year 2005-2006, the annual income of Mrs. Sunita was Rs. 2,00,000. She contributed 7.5% of her annual income towards Provident fund, got NSC of Rs. 10,000 and paid LIC premium of Rs. 15,000 in 2005-2006. In the same year, she donated Rs. 5000 to a charitable trust (50% relief). She paid advance tax of Rs. 250 per month for 11 months. Calculate the Income Tax paid by her in the last month.

Income Tax slab for a woman

Upto Rs. 1,35,000	Nil
Rs.135000 to 150000	10% of the income exceeding Rs.1,35,000
Rs.150000 to 250000	Rs.1500 + 20% of the income exceeding Rs.1,50,000.

Deduction on savings : Maximum Rs 1,00,000

Education cess : 2% of the Income Tax.

(6)

continued on page 4

A 21

(b) A man on the roof of a house which is 10 m high, observes the angle of elevation of the top of a tower as 45° and the angle of depression of the base of the tower as 30°. Find the answers for the following correct to two places of decimal.
(i) distance of the tower from the house
(ii) the height of the tower. (4)

Q 7:

(a) A page from the savings bank account of Mr. Advani is given below:

Date	Particulars	Debit Rs.	Credit Rs.	Balance Rs.
July 1	*B/F*			*2560*
July 9	*By cash*		*5400*	*7960*
July 24	*By cheque*		*450*	*8410*
Aug 10	*To cheque*	*850*		*7560*
Aug 27	*By cash*		*900*	*8460*
Sept 5	*To cheque*	*1200*		*7260*
Sept 11	*By cash*		*600*	*7860*
Oct 20	*To cash*	*4720*		*3140*
Dec 5	*By cheque*		*2800*	*5940*
Dec 18	*To cash*	*700*		*5240*

Calculate the interest at 4% per annum for the year ending on Dec 31. Give your answer to the nearest Rupee. (5)

(b) Use a graph paper for this question:
P′ is the image of P (2, 5) in the y axis.
Q′ is the image of Q (5, 5) in the line $x = 0$.
P″ is the image of P′ in the line OQ′ where O is the origin.
(i) Find P″
(ii) What is the special name given to quadrilateral OP′Q′P″ ?
(iii) State its line/s of symmetry. (5)

continued on page 5

A 22

Q 8:

(a) PQRS is a square. The bisector of $\angle$ SQR cuts PR and SR at T and V respectively. Prove that QV. TR = QT. SV (5)

(b) In a botanical experiment, the length of 150 fruits were measured and recorded as below:

Length in mm	20-30	30-40	40-50	50-60	60-70	70-80	80-90
frequency	15	25	18	16	14	22	40

Draw an ogive and estimate:
(i) the median (ii) the quartiles
(iii) the number of fruits with length 60 mm and above. (5)

Q 9:

(a) Find x and y if

$$\begin{bmatrix} 3 & -2 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} 2x \\ 1 \end{bmatrix} + 2 \begin{bmatrix} -4 \\ 5 \end{bmatrix} = 4 \begin{bmatrix} 2 \\ y \end{bmatrix}$$ (3)

(b) Construct a triangle ABC, with AB = 5 cm, BC = 6 cm and $\angle$ ABC = 60° using ruler and compass only. Locate by construction the point P such that
(i) P is equidistant from B& C and also equidistant from AB & BC.
(ii) Measure and record the length PB. (3)

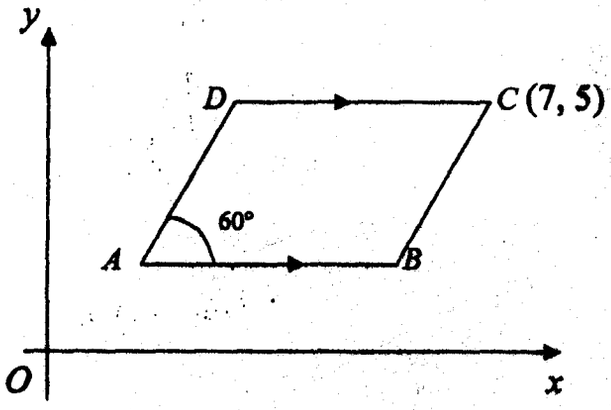
(c) A picture 20 cm x 30 cm is placed in a frame of border of uniform width. If the area of the border is equal to the area of the picture, find the width of the border. (4)

continued on page 6

A 23

Q 10:

(a) The figure below shows a parallelogram ABCD whose side AB is parallel to the x axis. $\angle A = 60°$ and vertex C is (7, 5). Find the equations of BC and CD. (3)



(b) Let f be the function defined by $f(x) = \frac{x}{x^2 + 1}$, $x \in R$.

Find (i) $f(1/x)$ (ii) $f(x-1)$ (iii) $f\{f(-1)\}$ (3)

(c) Find the mean for the following distribution: (4)

C.I.	25-35	35-45	45-55	55-65	65-75	75-85	85-95
Frequency	5	8	8	6	7	9	7

Q 11:

(a) The scale of a map is 1: 2,00,000. A plot of land of area 20 Km^2 is to be represented on the map. Find

(i) the number of kilometers on the ground which is represented by 1 cm on the map.

(ii) the area in Km^2 that can be represented by 1 cm^2

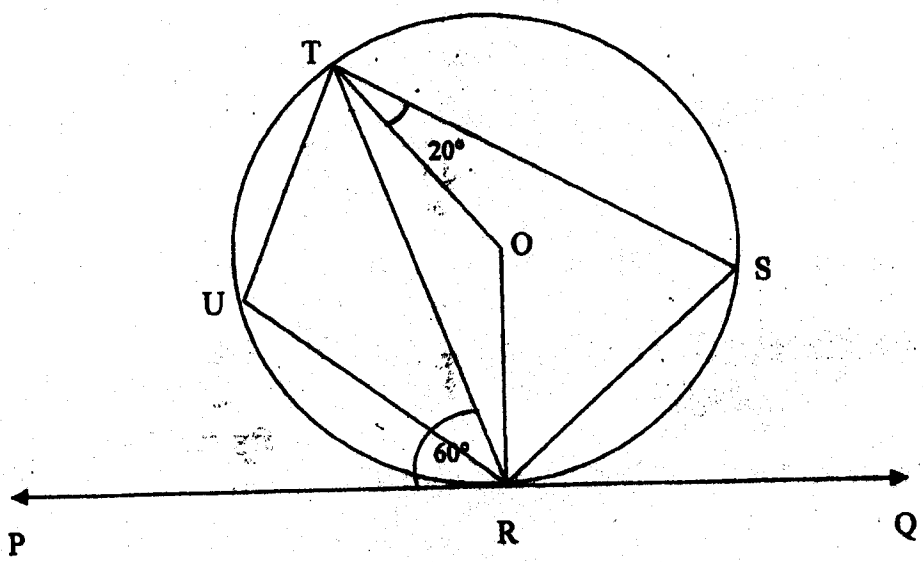
(iii) the area of the map that represents the plot of land. (3)

continued on page 7

A 24

(b) If $(4\cos^2 A - 3) = 0$, show that $\cos 3A = 4\cos^3 A - 3\cos A$ (3)

(c) In the figure below, O is the centre of the circle.
$\angle PRT = 60°$ and $\angle OTS = 20°$.
Find (i) $\angle RST$
(ii) $\angle SRQ$
(iii) $\angle ORS$
(iv) $\angle TUR$ (4)



End of Question Paper

A 25