ICSE 2008 : MATHEMATICS

MATHEMATICS - 2008

(Two hours and a half)

SECTION A (40 Marks)
Attempt **all** questions from this Section.

Question 1

(a) The simple interest on a sum of money for 2 years at 4% per annum is Rs.340. Find (i) the sum of money [1 1/2]

(a) The simple interest on a sum of money for 2 years at 4% per annum is Rs.340. Find(ii) the compound interest on this sum for one year payable **half yearly** at the same rate. [1 1/2]

(b) [3]

If $\frac{8a-5b}{8c-5d} = \frac{8a+5b}{8c+5d}$ ' prove that $\frac{a}{b} = \frac{c}{d}$

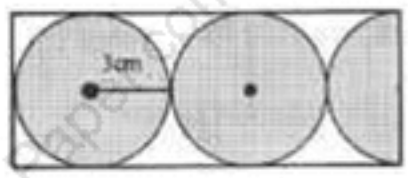
(c) If $(x-2)$ is a factor of $2x^3 - x^2 - px - 2$ [2]
(i) find the value of p.

(c) If $(x-2)$ is a factor of $2x^3 - x^2 - px - 2$ [2]
(ii) with the value of p, factorize the above expression completely.

Question 2

(a) Solve the given inequation and graph the solution on the number line. [3]
$2y - 3 < y + 1 \leq 4y + 7; y \in R$.

(b) In the given figure, find the area of the unshaded portion within the rectangle. [3]
(Take $\pi = 3.14$)



(c) A shopkeeper buys a camera at a discount of 20% from the wholesaler, the printed price of the camera being Rs.1600 and the rate of sales tax is 6%. The shopkeeper sells it to the buyer at the printed price and charges tax at the same rate. Find:
(i) The price at which the camera can be bought. [2]

(c) A shopkeeper buys a camera at a discount of 20% from the wholesaler, the printed price of the camera being Rs.1600 and the rate of sales tax is 6%. The shopkeeper sells it to the buyer at the printed price and charges tax at the same rate. Find:
(ii) The VAT (Value Added Tax) paid by the shopkeeper. [2]

Question 3

(a) David opened a Recurring Deposit Account in a bank and deposited Rs.300 per month for two years. If he received Rs.7725 at the time of maturity, find the rate of interest per annum. [3]

(b) If [3]

$$\begin{bmatrix} 1 & 4 \\ -2 & 3 \end{bmatrix} + 2M = 3 \begin{bmatrix} 3 & 2 \\ 0 & -3 \end{bmatrix}$$

find the matrix M.

(c) Use a graph paper for this question (Take 1 cm = 1 unit on both the axes). [1]
Plot the points A (−2, 0), B (4, 0), C (1, 4) and D (−2, 4).
(i) Draw the line of symmetry of ΔABC. Name it L_1.

(c) Use a graph paper for this question (Take 1 cm = 1 unit on both the axes). [1]
(ii) Plot the points A (−2, 0), B (4, 0), C (1, 4) and D (−2, 4).

(c) Use a graph paper for this question (Take 1 cm = 1 unit on both the axes). [1]
Plot the points A (−2, 0), B (4, 0), C (1, 4) and D (−2, 4).
(iii) Name the, figure ABED.

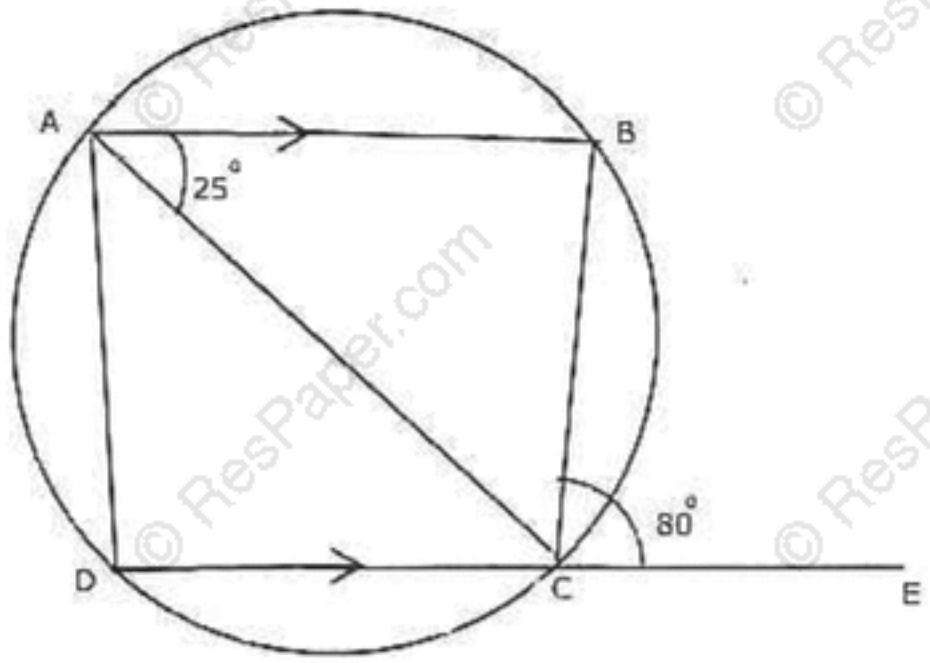
(c) Use a graph paper for this question (Take 1 cm = 1 unit on both the axes). [1]
Plot the points A (−2, 0), B (4, 0), C (1, 4) and D (−2, 4).
(iv) Draw all the lines of symmetry of the figure ABED.

Question 4

(a) Without using tables, evaluate: [3]

$$\frac{\sin 25^\circ}{\sec 65^\circ} + \frac{\cos 25^\circ}{\operatorname{cosec} 65^\circ}$$

(b) [1]



In the above figure, AB is parallel to DC, $\angle BCE = 80^\circ$ $\angle BAC = 25^\circ$
Find:
(i) $\angle CAD$

(b) Find: (ii) $\angle CBD$ [1]

(b) Find: (iii) $\angle ADC$ [1]

(c) Mr. Dhoni has an account in the Union Bank of India. The following entries are from his pass book: [3]

Date	Particulars	Withdrawals (in Rs.)	Deposits (in Rs.)	Balance (in Rs.)
Jan 3, 07	B/F	-	-	2642.00
Jan16	To self	640.00	-	2002.00
March 5	By cash	-	850.00	2852.00
April 10	To Self	1130.00	-	1722.00
April 25	By cheque	-	650.00	2372.00

June 15	By cash	577.00	-	1795.00

Calculate the interest from January 2007 to June 2007 at the rate of 4% per annum.

SECTION B (40 Marks)

Attempt any **four** questions from this Section.

Question 5

(a) A function in x is defined as [1]

$f(x) = \frac{x+2}{2x-1}$; $x \in R$ and $x \neq \frac{1}{2}$,find:

(i) f(−3)

(a) A function in x is defined as [1]

$f(x) = \frac{x+2}{2x-1}$; $x \in R$ and $x \neq \frac{1}{2}$,find:

(ii) f (x − 1)

(a) A function in x is defined as [1]

$f(x) = \frac{x+2}{2x-1}$; $x \in R$ and $x \neq \frac{1}{2}$,find:

(iii) x if f(x)=1.

[3]

(b) Prove the identity:

$$\frac{\sin A}{1 + \cos A} = \text{cosec } A - \cot A$$

(c) If A= (−4, 3) and B = (8, −6) [2]
(i) find the length of AB

(c) If A= (−4, 3) and B = (8, −6) [2]
(ii) In what ratio is the line joining AB, divided by the x-axis?

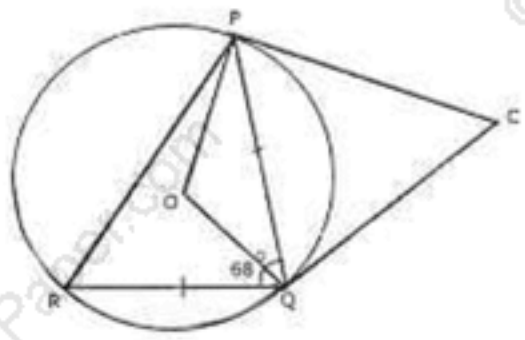
[10]

Question 6

(a) Solve the following quadratic equation for x and give your answer correct to two decimal places:
$5x\ (x + 2) = 3$

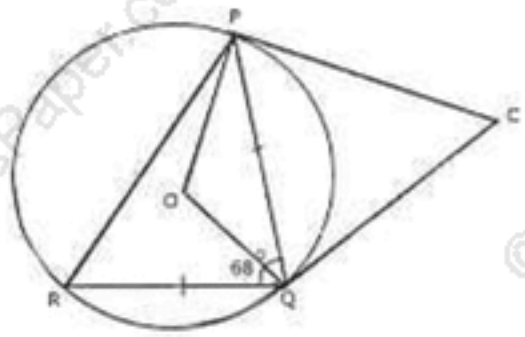
(b) In the figure given below PQ = QR, ∠RQP = 68°, PC and CQ are tangents to the circle with centre O.

(i) Calculate the values of: ∠QOP



(b) In the figure given below PQ = QR, ∠RQP = 68°, PC and CQ are tangents to the circle with centre O.

(ii) Calculate the values of: ∠QCP



(c) A company with 4000 shares of nominal value of Rs. 110 each declares an annual dividend of I5%. Calculate:

(i) The total amount of dividend paid by the company.

(c) A company with 4000 shares of nominal value of Rs. 110 each declares an annual dividend of I5%. Calculate:

(ii) The annual income of Shah Rukh who holds 88 shares in the company.

(c) A company with 4000 shares of nominal value of Rs. 110 each declares an annual dividend of I5%. Calculate:

(iii) If he received only l0% on his investment, find the price Shah Rukh paid for each share.

Question 7

(a) The income of Mr. Bachhan was as follows: [6]

. Basic Salary : Rs.20,000 Per month

. Dearness Allowance : Rs.12,000 per month

. Interest from Bank : Rs.16,000 for the whole year.

Savings

. Contribution towards Provident Fund 15% of Basic salary
. National Savings Certificate Rs.40,000
. Contribution towards LIC premium Rs.30,000 per year

Donations

. To National Defence Fund : Rs. I 2,000 (eligible for l00% tax exemption)

If a sum of Rs.3,000 was deducted every month towards Income tax from his salary for the first 11 months of the year, calculate the tax Mr. Bachhan has to pay in the last month of the financial year:

Tax slabs

UptoRs. 1,00,000	No tax
From Rs.1,00,001 to Rs.1,50,000	10% of the income exceeding Rs.1,00,000
From Rs.1,50,00 I toRs.2,50,000	Rs. 5000 + 20% of the income exceeding Rs.1,50,000
Above Rs.2,50,000	Rs.25,000 + 30%o of the income exceeding Rs.2,50,000.
Deductions against savings	Upto a maximum amount of Rs.1,00,000
Education Cess	2% of the tax

(b) A vertical pole and a vertical tower are on the same level ground. From the top of the pole the angle of elevation of the top of the tower is 60° and the angle of depression of the foot of the tower is 30°. Find the height of the tower if the height of the pole is 20 m. [4]

[10]

Question 8

(a) Find the H.C.F. of the given polynomials:

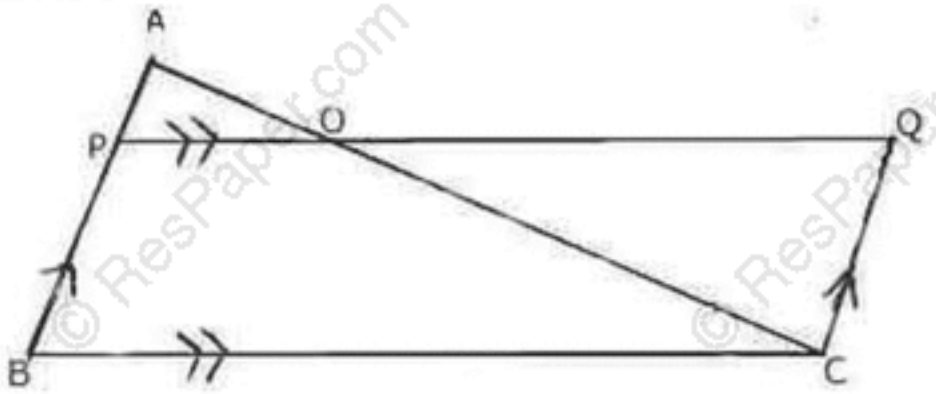
$x^2 - \frac{1}{a^2}$ and $x^2 + \frac{2x}{a} + \frac{1}{a^2}$

(b) Using a ruler and a pair of compasses only, construct:
(i) a triangle ABC, given AB = 4 cm, BC = 6 cm and ∠ABC: 90°.
(b) Using a ruler and a pair of compasses only, construct:
(ii) a circle which passes through the points A, B and C and mark its centre as O.
(c) Points A and B have coordinates (7, −3) and (1, 9) respectively. Find
(i) the slope of AB.
(c) Points A and B have coordinates (7, −3) and (1, 9) respectively. Find
(ii) the equation of the perpendicular bisector of the line segment AB.
(c) Points A and B have coordinates (7, −3) and (1, 9) respectively. Find
(iii) the value of 'p' if (−2, p) lies on it.

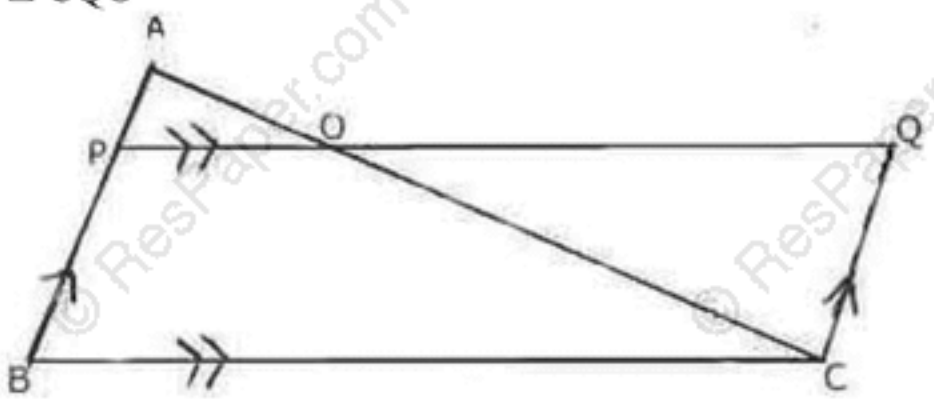
Question 9 [10]

Given $A = \begin{bmatrix} p & 0 \\ 0 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -q \\ 1 & 0 \end{bmatrix}$, $C = \begin{bmatrix} 2 & -2 \\ 2 & 2 \end{bmatrix}$ and $BA = C^2$

(a) Find the values of p and q.
(b) In ΔABC, AP : PB = 2 : 3. PO is parallel to BC and is extended to Q so that CQ is parallel to BA. Find:
(i) area Δ APO : area Δ ABC



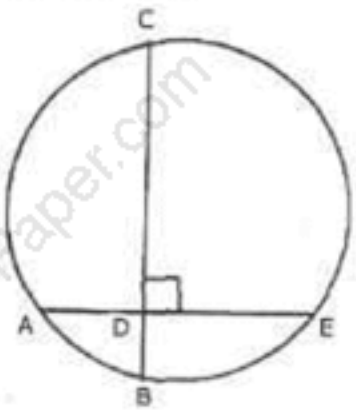
(b) In ΔABC, AP : PB = 2 : 3. PO is parallel to BC and is extended to Q so that CQ is parallel to BA. Find:
(ii) area Δ APO : area Δ CQO



(c) The volume of a conical tent is 1232 m^3 and the area of the bare floor is 154 m^2. Calculate the:
(i) radius of the floor.
(c) The volume of a conical tent is 1232 m^3 and the area of the bare floor is 154 m^2. Calculate the:
(ii) height of the tent.
(c) The volume of a conical tent is 1232 m^3 and the area of the bare floor is 154 m^2. Calculate the:
(iii) length of the canvas required to cover this conical tent if its width is 2m.

Question l0

(a) In the given figure, AE and BC intersect each other at point D. If ∠CDE = 90°, AB = 5 cm, BD = 4 cm and CD = 9 cm. find DE. [3]



(b) A straight line AB is 8 cm long. Locate by construction the locus of a point which is: [1]
(i) Equidistant from A and B.

[1]

(b) A straight line AB is 8 cm long. Locate by construction the locus of a point which is:
(ii) Always 4 cm from the line AB.

(b) A straight line AB is 8 cm long. Locate by construction the locus of a point which is: [1]
(iii) Mark two points X and Y, which are 4 cm from AB and equidistant from A and B, Name the figure AXBY.

(c)Some students planned a picnic. The budget for the food was Rs.480. As eight of them failed to join the party, the cost of the food for each member increased by Rs.l0. Find how many students went for the picnic. [4]

[9]

Question 11

(a) The weights of 50 apples were recorded as given below. Calculate mean weight, to the nearest gram, by the **Step Deviation Method**.

Weight in grams	No. of apples
80-85	5
85-85	8
90-95	10
95-100	12
100-105	8
105-110	4
110-115	3

(b) Using a graph paper, draw an ogive for the following distribution which shows the marks obtained in the General Knowledge paper by 100 students.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No.of Students	5	10	20	25	15	12	9	4

Use the ogive to estimate:
(i) the median

(b) Using a graph paper, draw an ogive for the following distribution which shows the marks obtained in the General Knowledge paper by 100
students.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No.of Students	5	10	20	25	15	12	9	4

Use the ogive to estimate:
(ii) the number of students who score marks above 65.