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/ Test Paper:

MATHEMATICS - 1996

(Two hours and a half)

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SECTION A (40 Marks)

Attempt **all** questions from this Section.

Question 1

A shopkeeper buys a box of 10 dozen apples for Rs. 180. He estimates that 20% of them would be rotten. He intends to sell each apple so as to make a profit of 60% on his cost, Assuming that 20% of the apples turn out to be rotten, find: [2]

(i) The number of good apples in the box;

(ii) The sum of money for which he should sell the good apples so as to make a profit of 60% on his cost; [2]

◀ .) The selling price of each apple in each the said profit. [▶

Question 2

[6]

A sum of Rs. 9,600 is invested for 3 years at 10% per annum at compound interest :

(i) What is the sum due at the end of the first year.

(ii) What is the sum due at the end of the second year.

(iii) Find the compound interest earned in 2 years.

(iv) Find the difference between the answers in (ii) and (i) and find the interest on this sum for one year.

.(v) Hence write down the compound interest for the third year.

Question 3

[9]

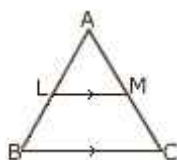
(a) The scale of a map is 1 : 200000. A plot of land of area 20 km² is to be represented on the map, find:

(i) The number of kilometres on the ground which is represented by 1 centimetre on the map.

(ii) The area in km² that can be represented by 1 cm². (iii) The area on the map that represents the plot of land.

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

(b) In the figure alongside (not drawn to scale), LM is parallel to BC : AB = 6cm, AL = 2cm and AC = 9cm. Calculate:



- (i) The length of CM;
 (ii) The value of the ratio = Area of triangle ALM/Area of the trapezium LBCM.

Question 4

Use ruler and compass only for the following question: [3]

Construct triangle BCP, where $CB = 5$ cm, $BP = 4$ cm, $\angle PBC = 45^\circ$.

Complete the rectangle ABCD such that:

- (i) P is equidistant from AB and BC;
 (ii) P is equidistant from C and D. [3]

Measure and write down the length of AB.

Question 5

The circumference of a circle is 123.2 cm. Taking $\pi = 22/7$, calculate: [2]

- (i) The radius of the circle in cm;
 (ii) The area of circle in cm^2 , correct to the nearest cm^2 ; [2]
 (iii) The effect on the area of the circle if the radius is doubled. [4]

Question 6 [7]

A trader gives two successive discounts of 15% and 10% on the marked price of an article.

- (i) If the marked price was Rs. 100, what would be the selling price?
 (ii) The actual selling price is Rs. 7,650. Calculate the actual marked price.
 (iii) The actual marked price is 25% more than the cost price. Calculate:
 (1) The cost price;
 (2) The profit or loss percent.

Question 7 [6]

Point (3, 0) and (-1, 0) are invariant points under reflection in the line L_1 ; points (0, -3) and (0, 1) are invariant points on reflection in line L_2 .

- (i) Name or write equations for the lines L_1 and L_2 .
 (ii) Write down the images of points P(3, 4) and Q(-5, -2) on reflection in L_1 . Name the images as P' and Q' respectively.
 (iii) Write down the image of P and Q on reflection in L_2 . Name the images as P'' and Q'' respectively.
 (iv) State or describe a single transformation that maps P' onto P''.

Question 8 [6]

Use graph paper for this question. Use 2 cm = 1 unit on both axes. Plot the points

A(-2, 4), B(2, 1) and C(-6, 1).

(i) Draw the line of symmetry of triangle ABC..

(ii) Mark the point D if the line in (i) and the line BC are both lines of symmetry of the quadrilateral ABCD; write down the co-ordinate of point D.

(iii) What kind of quadrilateral is figure ABCD.

(iv) Write down the equations of BC and the line of symmetry named in (i).

SECTION - B (48 Marks)

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

Question 9

(a) The domain and range of a function $f(x) = 3/x + 1$ are subsets of A and B respectively, where [6]

$$A = \left\{ \frac{-1}{2}, 0, \frac{2}{3}, \frac{6}{7}, 1 \right\}$$

$$B = \left\{ -5, 0, 4\frac{1}{2}, 5, 5\frac{1}{2} \right\}$$



List the elements of the function as ordered pairs.



(b) A man borrows Rs. 5,800 at 12% per annum compound interest. He repays Rs.1,800 at the end of every six months. Calculate the amount outstanding at the end of the third payment, Give your answer to the nearest Re. [6]

(c) Match the equations A, B, C, D with the lines L_1 , L_2 , L_3 , L_4 whose graphs are roughly drawn in the L_2 above diagram. [4]

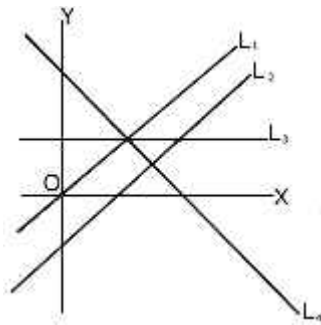
$$A = y = 2x$$

$$B = y - 2x + 2 = 0$$

$$C = 3x + 2y = 6$$

D = $y = 2$. Graph in which lines L_1 , L_2 , L_3 and L_4 are shown.

B 5 cm C

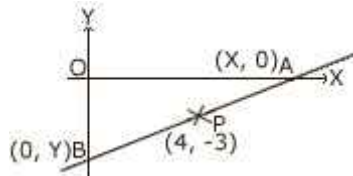
**Question 10**

[11]

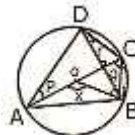
(a) A man invests a sum of money in Rs. 100 shares, paying 15% dividend quoted at 20% premium. If his annual dividend is Rs. 540, calculate:

- His total investment;
- The rate of return on his investment.

(b) The mid-point of the line segment AB shown in the diagram is $(4, -3)$. Write down the coordinates of A, B.



(c) In the figure; AC is the diameter of circle, centre O. Chord BD is perpendicular to AC. Write down the angles p, q, r in terms of x .

**Question 11**

[4]

(a) Copy and write 'True' and 'False' against each of the following statements:

- The relation 'is greater than' in the set of integers is reflexive.
- The relation 'is similar to' in the set of triangles is transitive.
- The relation 'is perpendicular to' in the set of lines is transitive.
- The relation 'is a factor of' in the set of integers is symmetric.

Question 11

(b) $P = \{x : 5 < 2x - 1 \leq 11, x \in \mathbb{R}\}$ [4]

$Q = \{x : -1 \leq 3 + 4x < 23, x \in \mathbb{I}\}$

Where \mathbb{R} = (real numbers), \mathbb{I} = (integers)

Represent P and Q on number lines. Write down the element $P \cap Q$.

(c) Given $f(x + 1) = 3x + 5$, evaluate: [4]

(i) $f(-2)$; (ii) $f(2x)$.

Question 12

(a) Write down the equation of the line whose gradient is $\frac{3}{2}$ and which passes through P , where P divides the line segment joining $A(-2, 6)$ and $B(3, -4)$ in the ratio $2 : 3$. [4]

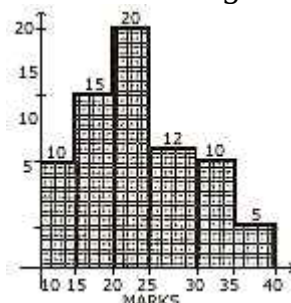
(b) Use ruler and compass only for this question. Construct the cyclic quadrilateral $ABCD$ in which $AB = 5$ cm, $BC = 8$ cm, angle $ABC = 67\frac{1}{2}^\circ$ and D is equidistant from B and C . D is equidistant from B and C . Measure and write down the length of CD . [4]

(c) Use logarithms to evaluate: [4]

$$3 \frac{\sqrt{0.8314}}{72.8}$$

Question 13

(a) The histogram represents the marks obtained by same candidates in an examination. Using the data in the diagram, calculate the mean mark. [4]

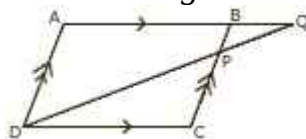


(b) In the above figure, alongside $ABCD$ is a parallelogram, P is a point on BC such that $BP : PC = 1 : 2$. DP produced meets AB produced at Q . Given area of triangle $CPQ = 20 \text{ cm}^2$, calculate: 2.4

(i) Area of triangle CDP ;

(ii) Area of parallelogram $ABCD$? [4]

(c) In triangle ABC , $AB = 12$ cm, angle $B = 58^\circ$, the perpendicular from A to BC meets it at D . The bisector of angle ABC meets AD at E . Calculate: 2.4



(i) The length of BD ;

(ii) The length of ED . [4]

Give your answers correct to one decimal place.

Question 14

(a) Use graph paper for this question. Take 2 cm = 2 unit on x-axis and 2 cm = 1 unit on y-axis. Solve graphically the following equations: [4]

$$3x + 5y = 12;$$

$$3x - 5y + 18 = 0$$

(Plot only three points per line)

(b) Evaluate x , y if [4]

$$\begin{bmatrix} 3 & -2 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} 2x \\ 1 \end{bmatrix} + 2 \begin{bmatrix} -4 \\ 5 \end{bmatrix} = \begin{bmatrix} 8 \\ 4y \end{bmatrix}$$

(c) A train covers a distance of 600 km/hr. Had the speed been $(x + 20)$ km/hr, the time taken to cover the distance would have been reduced by 5 hours. Write down an equation in x and Solve it to evaluate x . [4]

Question 15

[10]

(a) Use graph paper for this question. The following table shows the weights in gm of a sample of 100 potatoes taken from a large consignment:

Weight(gm)	Frequency
50 - 60	8
60 - 70	10
70 - 80	12
80 - 90	16
90 - 100	18
100 - 110	14
110 - 120	12
120 - 130	10

(i) Calculate the cumulative frequencies.

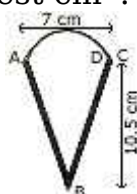
(ii) Draw the cumulative frequency curve and from it determine the median weight of the potatoes.

(b) The figure below shows the cross section of an ice-cream cone consisting of a cone surmounted by a hemisphere. The radius of the hemisphere is 3.5 cm and the height of the cone is 10.5 cm. The outer shell ABCDEF is shaded and is not filled with ice-cream. $AE = DC = 5$ cm, $AB \parallel EF$ and $BC \parallel FD$. Calculate:

(i) The volume of the ice-cream in the cone (the unshaded portion including the hemisphere) in cm^3 ;

(ii) The volume of the outer shell (the shaded portion) in cm^3 .

Give your answer correct to the nearest cm^3 .



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