

MATHEMATICS

(Two hours and a half)

Answers to this Paper must be written on the paper provided separately.

You will not be allowed to write during the first 15 minutes.

This time is to be spent in reading the question paper.

The time given at the head of this Paper is the time allowed for writing the answers.

Attempt all questions from Section A and any four questions from Section B.

All working, including rough work, must be clearly shown and must be done on the same sheet as the rest of the answer.

Omission of essential working will result in loss of marks.

The intended marks for questions or parts of questions are given in brackets [].

Mathematical tables are provided.

SECTION A (40 Marks)

Attempt all questions from this Section.

Question 1

(a) Find the value of 'x' and 'y' if:

[3]

$$2 \begin{bmatrix} x & 7 \\ 9 & y-5 \end{bmatrix} + \begin{bmatrix} 6 & -7 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 10 & 7 \\ 22 & 15 \end{bmatrix}$$

(b) Sonia had a recurring deposit account in a bank and deposited ₹600 per month for $2\frac{1}{2}$ [3]

years. If the rate of interest was 10% p.a., find the maturity value of this account.

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This paper consists of 7 printed pages and 1 blank page.

Turn over

(c) Cards bearing numbers 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20 are kept in a bag. A card [4]

is drawn at random from the bag. Find the probability of getting a card which is:

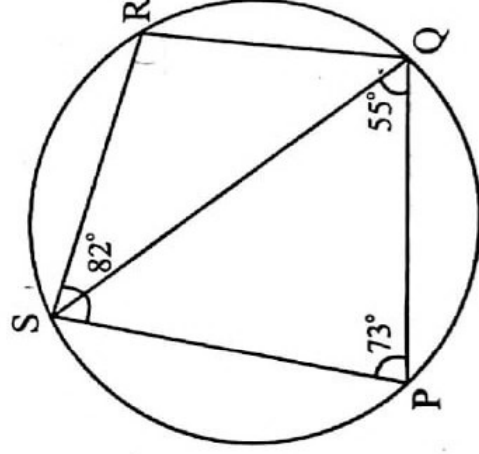
- (i) a prime number.
- (ii) a number divisible by 4.
- (iii) a number that is a multiple of 6.
- (iv) an odd number.

Question 2

(a) The circumference of the base of a cylindrical vessel is 132 cm and its height is [3]

25 cm. Find the

- (i) radius of the cylinder
 - (ii) volume of cylinder. (use $\pi = \frac{22}{7}$)
- (b) If $(k-3)$, $(2k+1)$ and $(4k+3)$ are three consecutive terms of an A.P., find the value [3]
of k .
- (c) PQRS is a cyclic quadrilateral. Given $\angle QPS = 73^\circ$, $\angle PQS = 55^\circ$ and $\angle PSR = 82^\circ$, [4]



calculate:

- (i) $\angle QRS$
- (ii) $\angle RQS$
- (iii) $\angle PRQ$

Question 3

- (a) If $(x+2)$ and $(x+3)$ are factors of $x^3 + ax + b$, find the values of 'a' and 'b'. [3]
- (b) Prove that $\sqrt{\sec^2\theta + \operatorname{cosec}^2\theta} = \tan\theta + \cot\theta$ [3]

(c) Using a graph paper draw a histogram for the given distribution showing the number [4]

of runs scored by 50 batsmen. Estimate the mode of the data:

Runs scored	3000-4000	4000-5000	5000-6000	6000-7000	7000-8000	8000-9000	9000-10000
No. of batsmen	4	18	9	6	7	2	4

Question 4

(a) Solve the following inequation, write down the solution set and represent it on the [3]

real number line:

$$-2 + 10x \leq 13x + 10 < 24 + 10x, x \in Z$$

(b) If the straight lines $3x - 5y = 7$ and $4x + ay + 9 = 0$ are perpendicular to one [3]

another, find the value of a .

(c) Solve $x^2 + 7x = 7$ and give your answer correct to two decimal places. [4]

SECTION B (40 Marks)

Attempt any four questions from this Section

Question 5

(a) The 4th term of a G.P. is 16 and the 7th term is 128. Find the first term and common [3]

ratio of the series.

(b) A man invests ₹22,500 in ₹50 shares available at 10% discount. If the dividend [3]

paid by the company is 12%, calculate:

(i) The number of shares purchased

(ii) The annual dividend received.

(iii) The rate of return he gets on his investment. Give your answer correct to the nearest whole number.

- (c) Use graph paper for this question (Take 2cm = 1 unit along both x and y axis). [4]
 ABCD is a quadrilateral whose vertices are A(2,2), B(2,-2), C(0,-1) and D(0,1).
- (i) Reflect quadrilateral ABCD on the y -axis and name it as A'B'CD.
- (ii) Write down the coordinates of A' and B'.
- (iii) Name two points which are invariant under the above reflection.
- (iv) Name the polygon A'B'CD.

Question 6

- (a) Using properties of proportion, solve for x . Given that x is positive: [3]
- $$\frac{2x + \sqrt{4x^2 - 1}}{2x - \sqrt{4x^2 - 1}} = 4$$
- (b) If $A = \begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 4 \\ -1 & 7 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 0 \\ -1 & 4 \end{bmatrix}$, find $AC + B^2 - 10C$. [3]
- (c) Prove that $(1 + \cot \theta - \operatorname{cosec} \theta)(1 + \tan \theta + \sec \theta) = 2$ [4]

Question 7

- (a) Find the value of k for which the following equation has equal roots. [3]
- $$x^2 + 4kx + (k^2 - k + 2) = 0$$
- (b) On a map drawn to a scale of 1 : 50,000, a rectangular plot of land ABCD has the following dimensions. AB = 6cm; BC = 8cm and all angles are right angles. Find: [3]
- (i) the actual length of the diagonal distance AC of the plot in km.
- (ii) the actual area of the plot in sq km.
- (c) A(2, 5), B(-1, 2) and C(5, 8) are the vertices of a triangle ABC, 'M' is a point on AB such that AM : MB = 1 : 2. Find the co-ordinates of 'M'. Hence find the equation of the line passing through the points C and M. [4]

Question 8

- (a) ₹7500 were divided equally among a certain number of children. Had there been 20 less children, each would have received ₹100 more. Find the original number of children. [3]
- (b) If the mean of the following distribution is 24, find the value of 'a'. [3]

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Number of students	7	a	8	10	5

- (c) Using ruler and compass only, construct a $\triangle ABC$ such that $BC = 5$ cm and $AB = 6.5$ cm and $\angle ABC = 120^\circ$ [4]
- (i) Construct a circum-circle of $\triangle ABC$
- (ii) Construct a cyclic quadrilateral $ABCD$, such that D is equidistant from AB and BC .

Question 9

- (a) Priyanka has a recurring deposit account of ₹1000 per month at 10% per annum. If she gets ₹5550 as interest at the time of maturity, find the total time for which the account was held. [3]

- (b) In $\triangle PQR$, MN is parallel to QR and

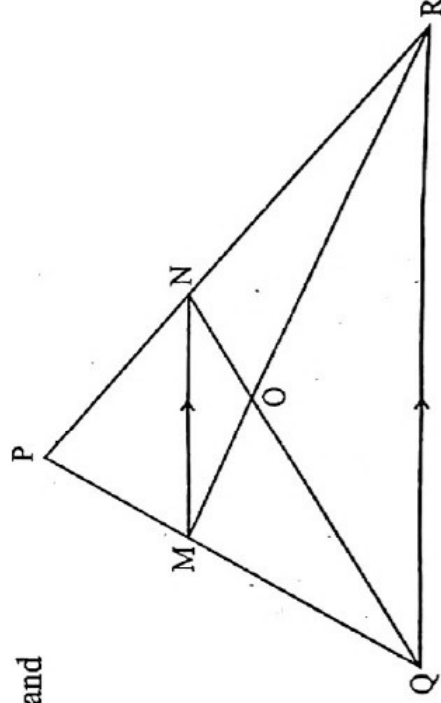
$$\frac{PM}{MQ} = \frac{2}{3}$$

- (i) Find

$$\frac{MN}{QR}$$

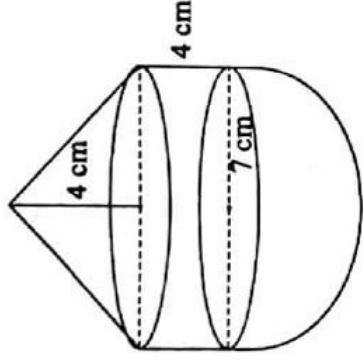
- (ii) Prove that $\triangle OMN$ and

$\triangle ORQ$ are similar.



- (iii) Find, Area of $\triangle OMN$: Area of $\triangle ORQ$.

- (c) The following figure represents a solid consisting of a right circular cylinder with a hemisphere at one end and a cone at the other. Their common radius is 7 cm. The height of the cylinder and cone are each of 4 cm. Find the volume of the solid.



[4]

Question 10

- (a) Use Remainder theorem to factorize the following polynomial:

[3]

$$2x^3 + 3x^2 - 9x - 10.$$

- (b) In the figure given below 'O' is the centre of the circle. If $\angle QRP = 20^\circ$. Find the value of 'x' giving reasons.

[3]

