

# Mathematics – Test Paper

Time Allowed : 2½ hours

Max. Marks : 80

## General Instructions :

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 the loss of marks.  
**Mathematical tables are provided.**

## Section A (40 Marks)

Attempt **all** questions from this section

1. (a) Simplify :  $-10\frac{1}{3} < \frac{5y}{3} + 3 \leq \frac{y}{2} + 5\frac{1}{3}$ ,  $y \in \mathbb{R}$

Graph the solution set on the number line. [3]

(b) The polynomials  $(px^3 + 3x^2 - 3)$  and  $(2x^3 - 5x + p)$  when divided by  $(x - 4)$  leave the same remainder. Find the value of  $p$ . [3]

(c) Given  $A = \begin{bmatrix} 2 & 0 \\ -3 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 0 & 1 \\ -2 & 3 \end{bmatrix}$ .

Calculate : (i)  $3A - 2B$  (ii)  $A^2 - BA$ . [4]

2. (a) Rupa's passbook has the following entries :

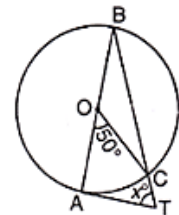
Date 2009	Particulars	Amount Withdrawn (Rs)	Amount Deposited (Rs)	Balance (Rs)
Feb. 19	By cash	—	1000	1000
Feb. 25	By cash	—	2000	3000
March 1	By salary	—	5000	8000
March 10	To cheque	2000	—	6000
March 27	To cheque	500	—	5500
April 1	By salary	—	5000	10500

Find the amount received by him, if she closes her account on 11th April, when interest rate is 5% p.a. [4]

(b) The height of a cone is 5 cm. Find the height of another cone whose volume is sixteen times its volume and radius equal to its diameter. [3]

(c) If a pair of opposite sides of a cyclic quadrilateral are equal, prove that its diagonals are equal. [3]

3. (a) In the given figure, AB is a diameter of the circle with centre O and  $\angle OAT = 90^\circ$  and C is a point on the circle. Calculate the numerical value of  $x$ . [3]



(b) If the mean of 10 observations is 20 and that of another 15 observations is 16, find the mean of all 25 observations. [3]

(c) On a graph paper plot the points A (-2, 0), B (4, 0), C (1, 4), D (-2, 4) and E (4, 4). Give the specific name to quadrilateral ABED.

Name the common line of symmetry of  $\triangle ABC$  and quadrilateral ABED. [4]

4. (a) Show that  $(3x - 1)$  is a factor of  $6x^2 + 7x - 3$ . [3]

(b) Without using tables, find the value of  $\frac{\operatorname{cosec}^2 67^\circ - \tan^2 23^\circ}{\sec^2 20^\circ - \cot^2 70^\circ}$ . [3]

(c) If  $(2x + 3y) : (3x + 5y) = 18 : 29$ , find  $x : y$  [4]

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### Section B (40 Marks)

Attempt **any four** questions from this section

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5. (a) A company with 10000 shares of nominal value Rs 100 declares an annual dividend of 8% to the shareholders.  
(i) Calculate the total amount of dividend paid by the company.

(ii) Ramesh had bought 90 shares of the company at Rs 150 per share. Calculate the dividend he receives and the percentage return on his investment. [4]

(b) Construct a triangle ABC in which  $AB = 6$  cm,  $BC = 4$  cm and  $AC = 5.5$  cm.

Draw the incircle of the triangle. [3]

(c) Given that the equation  $kx^2 - 20x + 25 = 0$  has equal roots, find the value of  $k$ . Also, find the roots. [3]

6. (a) A vertical tower is 20 m high. A man standing at some distance from the tower knows that the cosine of the angle of elevation of the top of the tower is 0.53. How far is he standing from the foot of the tower? [4]

(b) What is the locus of a point which is equidistant from three given non-collinear points A, B and C? Justify your answer. [3]

(c) The value of a flat worth Rs 500000 is depreciating at the rate of 8% p.a. In how many years will its value be reduced to Rs 389344? [3]

7. (a) The point A (-6, 4) on reflection in y-axis is mapped as A'. The point A' on reflection in the origin is mapped as A''.

(i) Find the co-ordinates of A'.

(ii) Find the co-ordinates of A''.

(iii) Write down a single transformation that maps A to A''. [3]

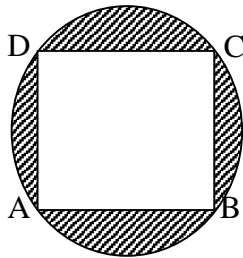
(b) Using quadratic formula, solve :  $\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}$  [4]

(c) In a lottery there are 5 prizes and 20 blanks. What is the probability of getting a prize? [3]

8. (a) Prove that the area of the equilateral triangle described on the side of a square is half the area of the equilateral triangle described on its diagonal. [3]
- (b) A manufacturer sold a fridge to a wholesaler for Rs 14,000. The wholesaler sold it to a trader at a profit of Rs 2500. If the trader sold it to the customer at a profit of Rs 3000, find the :  
 (i) total VAT collected by the state government at the rate of 6%  
 (ii) amount paid by the customer for the fridge. [4]
- (c) If  $\begin{bmatrix} a & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 4 & 3 \\ -3 & 2 \end{bmatrix} = \begin{bmatrix} b & 11 \\ 4 & c \end{bmatrix}$ , find the values of a, b and c. [3]

9. (a) In the figure, ABCD is a square of side 5 cm inscribed in a circle.  
 Find :  
 (i) The radius of the circle,  
 (ii) The area of the shaded region.

(Take  $\pi = 3.14$ ) [4]



- (b) Find the equation of the line through the intersection of  $2x + 5y - 4 = 0$  with  $x$ -axis and parallel to the line  $3x - 7y + 8 = 0$ . [3]
- (c) In what time will Rs 800 amount to Rs 882 at 5% p.a. compound interest? [3]

10. (a) A  $(6, y)$ , B  $(-4, 9)$  and C  $(x, -1)$  are the vertices of a triangle ABC whose centroid is the origin. Calculate the values of  $x$  and  $y$ . [4]

- (b) Weight of 100 students is recorded below :

Weight in kg	30-35	35-40	40-45	45-50	50-55	55-60
No. of students	4	16	40	22	10	8

Draw an ogive and hence estimate the median. [6]

11. (a) A box contains 16 cards bearing numbers 1, 2, 3, ...16 respectively. If a card is drawn at random from the box, find the probability that the number on the card is :  
 (i) an odd number  
 (ii) a prime number  
 (iii) a number not divisible by 4. [3]

- (b) Prove that :  $\cot A - \tan A = \frac{2\cos^2 A - 1}{\sin A \cos A}$ . [3]

- (c) Find the mean of the following data :

Class	0-10	10-20	20-30	30-40	40-50
Frequency	12	16	6	7	9

[4]