

Mathematics –Test Paper

Time Allowed : 2 ½ hours

Max. Marks : 80

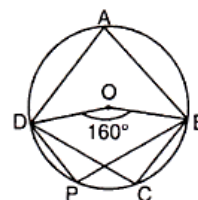
General Instructions :

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) In the figure, ABCD is a cyclic quadrilateral, O is the centre of the circle.
 If $\angle BOD = 160^\circ$, find $\angle BPD$ and $\angle BCD$. [3]



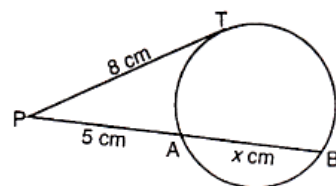
- (b) If \bar{x} is the mean of $x_1, x_2, x_3, \dots, x_n$, then prove that the mean of $x_1 + a, x_2 + a, \dots, x_n + a$ is $\bar{x} + a$. [4]
- (c) Using ruler and a pair of compasses, construct a rectangle ABCD in which $AB = 5$ cm and $AD = 3$ cm. Construct its lines of symmetry. [3]
2. (a) Find the range of values of x , which satisfy $-\frac{1}{3} < \frac{x}{2} - \frac{1}{3} < \frac{1}{6}$. [4]
- Graph the values of x on the real line. [4]
- (b) Without actual division, find the remainder obtained on dividing $(3x^2 + 5x - 9)$ by $3x + 2$. [3]
- (c) Given $P = \begin{bmatrix} -3 & 1 \\ 2 & 0 \end{bmatrix}$ and $Q = \begin{bmatrix} -3 & 2 \\ 1 & 4 \end{bmatrix}$, calculate $PQ + Q^2$. [3]
3. (a) Entries in a savings account passbook are as follows :

Date	Particulars	Withdrawn (Rs)	Deposited (Rs)	Balance (Rs)
4-2-2003	B/F	—	—	2150
10-2-2003	By cash	—	350	2500
1-5-2003	To cheque	400	—	2100
21-5-2003	By cash	—	400	2500
2-7-2003	To cheque	1500	—	1000

Calculate the interest for the six months (February to July) at 4.5% p.a. on minimum balance on or after 10th day of each month. [4]

- (b) If $(3a + 5b) : (3a - 5b) = (3c + 5d) : (3c - 5d)$, show that $a : b = c : d$. [3]
- (c) A spherical ball of iron has been melted and recast into smaller ones. If the radius of each of the smaller ball is one-fourth of the original one, how many such balls can be made? How does the total surface of the smaller balls compare with that of the original one? [3]

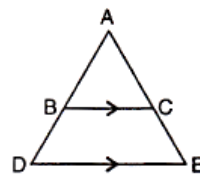
4. (a) An article is available for Rs 6048 inclusive of sales tax at the rate of 8%. Find its list price. What will be its new selling price if the rate of sales tax changes to 12%? [4]
 (b) Solve for θ : $2\cos 3\theta = 1$, $0^\circ < \theta < 90^\circ$. [3]
 (c) Find the unknown length x in the figure. [3]



Section B (40 Marks)

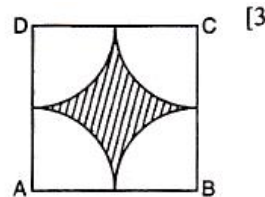
Attempt **any four** questions from this section

5. (a) A part of Rs 3020 is invested in 6% Rs 100 shares at Rs 97 and the rest in 12% Rs 100 shares at Rs 108. If both bring the same dividend, find the (i) sum invested in the shares selling at discount (ii) sum invested in the shares selling above par (iii) total dividend. [3]
 (b) Take points P and Q at a distance of 9 cm from each other. At P, draw a circle of radius 1.5 cm and at Q, draw a circle of radius 2.5 cm.
 Locate point X in PQ such that $PX = 3$ cm. Through X, draw a tangent to the circle with centre P and a tangent to the circle with centre Q. Use ruler and compasses only. [4]
 (c) Find a matrix X such that $X + \begin{bmatrix} 4 & 6 \\ -3 & 7 \end{bmatrix} = \begin{bmatrix} 3 & 1 \\ -5 & -2 \end{bmatrix}$ [3]
6. (a) Write down the co-ordinates of the image of the point (4, -5) when :
 (i) reflected in x-axis,
 (ii) reflected in y-axis,
 (iii) reflected in x-axis followed by reflection in y-axis,
 (iv) reflected in the origin. [3]
 (b) One-fourth of a herd of camels was seen in the forest. Twice the square root of the herd had gone to mountain and the remaining 15 camels were on the bank of river. Find the total number of camels. [4]
 (c) Draw a regular hexagon of side 2.5 cm. Circumscribe a circle to it. [3]
7. (a) In the figure, BC is parallel to DE. Area of $\triangle ABC = 25 \text{ cm}^2$, area of trapezium BCED = 24 cm^2 , DE = 14 cm. Calculate the length of BC. [3]

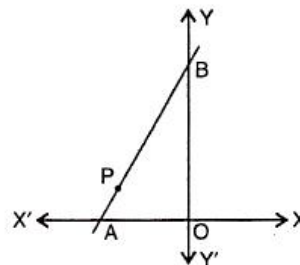


- (b) If the roots of the equation $l(m-n)x^2 + m(n-l)x + n(l-m) = 0$ are equal, show that $m = \frac{2ln}{l+n}$. [4]
 (c) David received Rs 7875 as the maturity amount of a monthly recurring deposit of 2 years at 9% p.a. Find the monthly instalment. [3]
8. (a) Find the height of a mountain, if the elevation of its top at an unknown distance from the base is 30° and at a distance 10 km further off from the mountain, along the same line, the angle of elevation is 15° . [4]
 (b) Draw two intersecting lines to include an angle of 30° . Locate points which are equidistant from these lines and also 2 cm away from their point of intersection. How many such points exist? [3]
 (c) The value of a building decreases every year at the rate of 5%. If its value at the end of 3 years be Rs 411540, what was its original value at the beginning of these three years? [3]

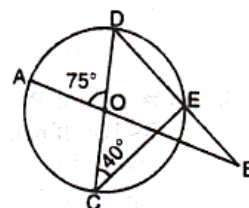
9. (a) In the figure, ABCD is a square of side 14 cm and A, B, C, D are corners of circular arcs, each of radius 7 cm. Find the area of the shaded region. [3]



- (b) In the figure, line APB meets the x -axis at A, y -axis at B. P is the point $(-4, 2)$ and $AP : PB = 1 : 2$. Write down the coordinates of A and B. [4]



- (c) In the figure, the straight lines AB and CD pass through the centre O of the circle. If $\angle AOD = 75^\circ$ and $\angle OCE = 40^\circ$, find : (i) $\angle CDE$ (ii) $\angle OBE$ [3]



10. (a) Show that the points A $(1, 1)$, B $(-1, -1)$ and C $(-\sqrt{3}, \sqrt{3})$ are the vertices of an equilateral triangle. [4]
(b) Attempt this question on a graph paper.

Marks less than	10	20	30	40	50	60	70	80	90	100
No. of students	5	10	30	60	105	180	270	355	390	400

Use 2 cm = 10 units on both the axes and plot these values and draw a smooth curve through the points.
From the graph estimate : (i) the median marks (ii) the quartile marks. [6]

11. (a) In a lottery, there are 15 prizes and 85 blanks. Find the probability of getting a prize. [3]
(b) Prove that : $\sin A (1 + \tan A) + \cos A (1 + \cot A) = \sec A + \operatorname{cosec} A$ [4]
(c) If the mean of the following observations is 54, find the value of p .

Variates	10	30	50	70	90
Frequency	17	8	p	24	19

[3]