

## BOARD QUESTION PAPER: MARCH 2024

### Mathematics Part - II

**Time: 2 Hours**

**Max. Marks: 40**

**Note:**

- i. All questions are compulsory.
- ii. Use of a calculator is not allowed.
- iii. The numbers to the right of the questions indicate full marks.
- iv. In case of MCQs [Q. No. 1(A)] only the first attempt will be evaluated and will be given credit.
- v. Draw proper figures wherever necessary.
- vi. The marks of construction should be clear. Do not erase them.
- vii. Diagram is essential for writing the proof of the theorem.

**Q.1. (A) Four alternative answers for each of the following sub-questions are given. Choose the alternative and write its alphabet:** [4]

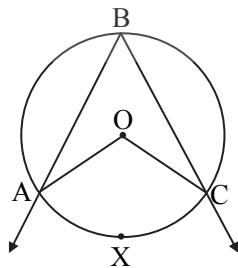
1. Out of the dates given below which date constitutes a Pythagorean triplet?  
 (A) 15/8/17      (B) 16/8/16      (C) 3/5/17      (D) 4/9/15
2.  $\sin \theta \times \operatorname{cosec} \theta = ?$   
 (A) 1      (B) 0      (C)  $\frac{1}{2}$       (D)  $\sqrt{2}$
3. Slope of X-axis is \_\_\_\_\_  
 (A) 1      (B) -1      (C) 0      (D) Cannot be determined
4. A circle having radius 3 cm, then the length of its largest chord is \_\_\_\_\_  
 (A) 1.5 cm      (B) 3 cm      (C) 6 cm      (D) 9 cm

**(B) Solve the following sub-questions:** [4]

1. If  $\Delta ABC \sim \Delta PQR$  and  $AB : PQ = 2 : 3$ , then find the value of  $\frac{A(\Delta ABC)}{A(\Delta PQR)}$ .
2. Two circles of radii 5 cm and 3 cm touch each other externally. Find the distance between their centres.
3. Find the side of a square whose diagonal is  $10\sqrt{2}$  cm.
4. Angle made by the line with the positive direction of X-axis is  $45^\circ$ . Find the slope of that line.

**Q.2. (A) Complete any two activities and rewrite it:** [4]

1.



In the above figure,  $\angle ABC$  is inscribed in arc ABC.

If  $\angle ABC = 60^\circ$ , find  $m\angle AOC$ .

**Solution:**

$$\angle ABC = \frac{1}{2} m(\text{arc AXC}) \quad \dots \boxed{\phantom{000}}$$

$$60^\circ = \frac{1}{2} m(\text{arc AXC})$$

$$\boxed{\phantom{000}} = m(\text{arc AXC})$$

But  $m\angle AOC = \boxed{m(\text{arc} \dots)}$

...[Property of central angle]

$\therefore m\angle AOC = \boxed{\phantom{000}}$

2. Find the value of  $\sin^2\theta + \cos^2\theta$ .

**Solution:**

In  $\Delta ABC$ ,  $\angle ABC = 90^\circ$ ,  $\angle C = \theta^\circ$ .

$AB^2 + BC^2 = \boxed{\phantom{000}}$

...[Pythagoras theorem]

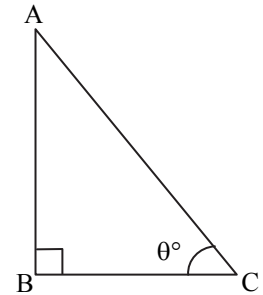
Divide both sides by  $AC^2$

$$\frac{AB^2}{AC^2} + \frac{BC^2}{AC^2} = \frac{AC^2}{AC^2}$$

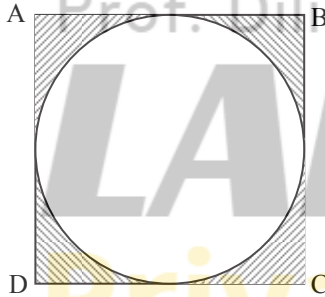
$\therefore \left(\frac{AB}{AC}\right)^2 + \left(\frac{BC}{AC}\right)^2 = 1$

But  $\frac{AB}{AC} = \boxed{\phantom{000}}$  and  $\frac{BC}{AC} = \boxed{\phantom{000}}$

$\therefore \sin^2\theta + \cos^2\theta = \boxed{\phantom{000}}$



3. Prof. Dilip U. Pal's



In the figure given above,  $\square ABCD$  is a square and a circle is inscribed in it. All sides of a square touch the circle.

If  $AB = 14$  cm, find the area of shaded region.

**Solution:**

Area of square =  $(\boxed{\phantom{000}})^2$  ...[Formula]

=  $14^2$

=  $\boxed{\phantom{000}}$   $\text{cm}^2$

Area of circle =  $\boxed{\phantom{000}}$  ...[Formula]

=  $\frac{22}{7} \times 7 \times 7$

=  $154 \text{ cm}^2$

Area of shaded portion = Area of square – Area of circle

=  $196 - 154$

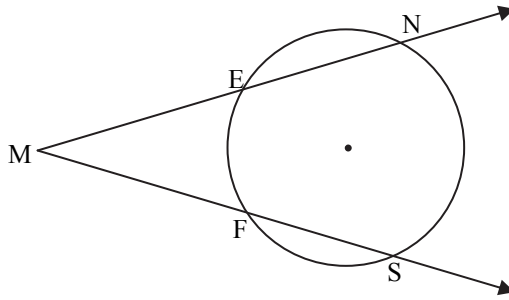
=  $\boxed{\phantom{000}}$   $\text{cm}^2$

**(B) Solve any four of the following sub-questions:**

**[8]**

- Radius of a sector of a circle is 3.5 cm and length of its arc is 2.2 cm. Find the area of the sector.
- Find the length of the hypotenuse of a right-angled triangle if remaining sides are 9 cm and 12 cm.

3.



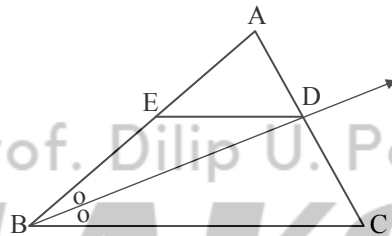
In the above figure,  $m(\text{arc NS}) = 125^\circ$ ,  $m(\text{arc EF}) = 37^\circ$ .  
 Find the measure of  $\angle NMS$ .

4. Find the slope of the line passing through the points A(2, 3), B(4, 7).
5. Find the surface area of a sphere of radius 7 cm.

**Q.3. (A) Complete any one activity of the following and rewrite it:**

[3]

1.



In  $\triangle ABC$ , ray BD bisects  $\angle ABC$ ,  $A - D - C$ , seg  $DE \parallel$  side BC,  $A - E - B$ , then for showing  $\frac{AB}{BC} = \frac{AE}{EB}$ , complete the following activity:

**Proof:**

In  $\triangle ABC$ , ray BD bisects  $\angle B$

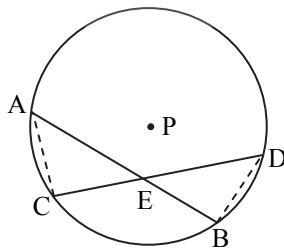
$$\therefore \frac{\square}{BC} = \frac{AD}{DC} \quad \dots\text{(I)} \quad (\square)$$

In  $\triangle ABC$ ,  $DE \parallel BC$

$$\therefore \frac{\square}{EB} = \frac{AD}{DC} \quad \dots\text{(II)} \quad (\square)$$

$$\frac{AB}{\square} = \frac{\square}{EB} \quad \dots[\text{From (I) and (II)}]$$

2.



**Given:** Chords AB and CD of a circle with centre P intersect at point E.

**To prove:**  $AE \times EB = CE \times ED$

**Construction:** Draw seg AC and seg BD.

Fill in the blank and complete the proof.

**Proof:**

In  $\triangle CAE$  and  $\triangle BDE$ .

$$\angle AEC \cong \angle DEB \quad \dots \square$$

$$\square \cong \angle BDE \text{ (angles inscribed in the same arc)}$$

$$\therefore \triangle CAE \sim \triangle BDE$$

... 

$$\therefore \frac{\boxed{\phantom{000}}}{DE} = \frac{CE}{\boxed{\phantom{000}}}$$

... 

$$\therefore AE \times EB = CE \times ED.$$

**(B) Solve any two of the following sub-questions:****[6]**

- Determine whether the points are collinear.  
A(1, -3), B(2, -5), C(-4, 7)
- $\triangle ABC \sim \triangle LMN$ . In  $\triangle ABC$ , AB = 5.5 cm, BC = 6 cm, CA = 4.5 cm. Construct  $\triangle ABC$  and  $\triangle LMN$  such that  $\frac{BC}{MN} = \frac{5}{4}$ .
- Seg PM is a median of  $\triangle PQR$ , PM = 9 and  $PQ^2 + PR^2 = 290$ , then find QR.
- Prove that, 'If a line parallel to a side of a triangle intersects the remaining sides in two distinct points, then the line divides the side in the same proportion.'

**Q.4. Solve any two of the following sub-questions:****[8]**

- $\frac{1}{\sin^2 \theta} - \frac{1}{\cos^2 \theta} - \frac{1}{\tan^2 \theta} - \frac{1}{\cot^2 \theta} - \frac{1}{\sec^2 \theta} - \frac{1}{\operatorname{cosec}^2 \theta} = -3$ , then find the value of  $\theta$ .
- A cylinder of radius 12 cm contains water up to the height 20 cm. A spherical iron ball is dropped into the cylinder and thus water level raised by 6.75 cm. What is the radius of iron ball?
- Draw a circle with centre O having radius 3 cm. Draw tangent segments PA and PB through the point P outside the circle such that  $\angle APB = 70^\circ$ .

**Q.5. Solve any one of the following sub-questions:****[3]**

- $\square ABCD$  is trapezium, AB  $\parallel$  CD diagonals of trapezium intersect in point P.  
Write the answers of the following questions:
  - Draw the figure using given information.
  - Write any one pair of alternate angles and opposite angles.
  - Write the names of similar triangles with test of similarity.
- AB is a chord of a circle with centre O. AOC is diameter of circle, AT is a tangent at A.  
Write answers of the following questions:
  - Draw the figure using given information.
  - Find the measures of  $\angle CAT$  and  $\angle ABC$  with reasons.
  - Whether  $\angle CAT$  and  $\angle ABC$  are congruent? Justify your answer.