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 $\frac{A(\Delta ABC)}{A(\Delta PQR)}$.

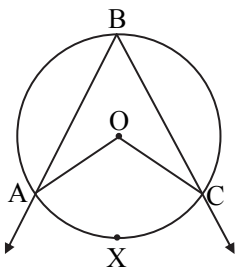
2. Two circles of radii 5 cm and 3 cm touch each other externally. Find the distance between their centres.

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°. Find the slope of that line.

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

1.



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In the above figure, ∠ABC is inscribed in arc ABC.
If ∠ABC = 60°, find m∠AOC.

Solution:

$\angle ABC = \frac{1}{2}$ m(arc AXC) … [ ]

$60° = \frac{1}{2}$ m(arc AXC)

[ ] = m(arc AXC)

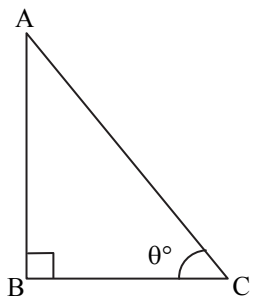
But m∠AOC = [m(arc.....)] …[Property of central angle]

∴ m∠AOC = [ ]

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

Solution:

In Δ ABC, ∠ABC = 90°, ∠C = θ°.



$AB^2 + BC^2$ = [ ] …[Pythagoras theorem]

Divide both sides by AC^2

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

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

But $\frac{AB}{AC}$ = [ ] and $\frac{BC}{AC}$ = [ ]

∴ $\sin^2\theta + \cos^2\theta$ = [ ]

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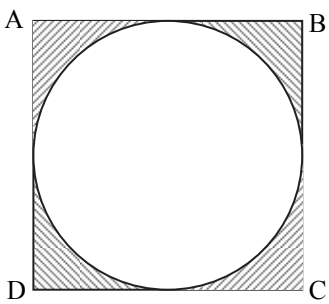
3.



In the figure given above, □ABCD is a square and a circle in 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 = $\left([\ ]\right)^2$ …[Formula]

$= 14^2$

= [ ] cm^2

Area of circle = [ ] …[Formula]

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

$= 154\ cm^2$

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

= 196 – 154

= [ ] cm^2

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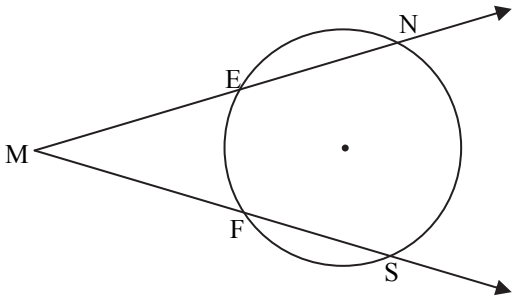
(B) Solve any *four* of the following sub-questions: **[8]**

1. 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.
2. Find the length of the hypotenuse of a right-angled triangle if remaining sides are 9 cm and 12 cm.

3.



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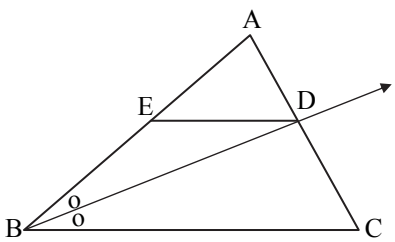
In the above figure, m(arc NS) = 125°, m(arc EF) = 37°.
Find the measure of ∠NMS.

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 ΔABC, ray BD bisects ∠ABC, A – D – C, seg DE || side BC, A – E – B, then for showing $\frac{AB}{BC} = \frac{AE}{EB}$, complete the following activity:

Proof:

In ΔABC, ray BD bisects ∠B

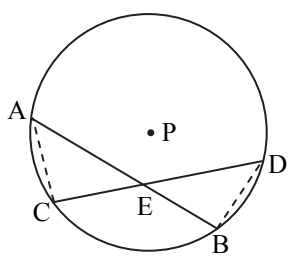
∴ $\frac{\square}{BC} = \frac{AD}{DC}$ …(I) (☐)

In ΔABC, DE || BC

∴ $\frac{\square}{EB} = \frac{AD}{DC}$ …(II) (☐)

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

2.



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Given: Chords AB and CD of a circle with centre P intersect at point E.
To prove: AE × EB = CE × ED
Construction: Draw seg AC and seg BD.
Fill in the blank and complete the proof.
Proof:
In ΔCAE and ΔBDE.
∠AEC ≅ ∠DEB …. ☐
☐ ≅ ∠BDE (angles inscribed in the same arc)

$\therefore$ $\Delta CAE \sim \Delta BDE$ … [ ]

$\therefore$ $\frac{\square}{DE} = \frac{CE}{\square}$ … [ ]

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

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

1. Determine whether the points are collinear.
   A(1, –3), B(2, –5), C(–4, 7)

2. $\Delta ABC \sim \Delta LMN$. In ΔABC, AB = 5.5 cm, BC = 6 cm, CA = 4.5 cm. Construct ΔABC and ΔLMN such that $\frac{BC}{MN} = \frac{5}{4}$.

3. Seg PM is a median of ΔPQR, PM = 9 and $PQ^2 + PR^2 = 290$, then find QR.

4. 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]**

1. $\frac{1}{\sin^2\theta} - \frac{1}{\cos^2\theta} - \frac{1}{\tan^2\theta} - \frac{1}{\cot^2\theta} - \frac{1}{\sec^2\theta} - \frac{1}{\operatorname{cosec}^2\theta} = -3$, then find the value of θ.

2. 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?

3. 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 $\angle APB = 70°$.

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

1. □ABCD is trapezium, AB || CD diagonals of trapezium intersects in point P.
   Write the answers of the following questions:
   a. Draw the figure using given information.
   b. Write any one pair of alternate angles and opposite angles.
   c. Write the names of similar triangles with test of similarity.

2. 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:
   a. Draw the figure using given information.
   b. Find the measures of $\angle CAT$ and $\angle ABC$ with reasons.
   c. Whether $\angle CAT$ and $\angle ABC$ are congruent? Justify your answer.

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