# 3. TOPIC – Tangents To A Circle

## VERY SHORT ANSWER TYPE QUESTIONS(2marks)

Q1. O is the Centre of a circle of radius 8 cm. The tangent at a point A on the circle cuts a line through O at B such that AB=15cm. Find the radius of the circle.

Q2. If PT is a tangent at T to a circle whose center is O and OP=17cm, OT=8cm, Find the length of the tangent segment PT.

Q3. If TP and TQ are two tangents to a circle with center O so that  $\angle POQ = 110^\circ$ , then, what is the value of  $\angle PTQ$ ?

Q4. *F*rom a point Q, the length of the tangent to a circle is 24cm and the distance of Q from the Centre is 26cm.Find the radius of the circle.

Q5. If from an external point B of a circle with Centre O, two tangents BC and BD are drawn such that  $\angle DBC = 120^\circ$ , prove that BC + BD = BO.



Q6. In figure, AB and CD are common tangents to two circles of unequal radii. Prove that AB = CD.



Q7. If a chord AB subtends an angle of 60° at the Centre of a circle, then find angle between the tangents at A and B.



Q8. If angle between two tangents drawn from a point 'P' to a circle of radius 'a' and Centre O is 90°, then find OP.



Q9. Show that the tangent to the circumcircle of an isosceles triangle ABC at A, in which AB = AC, is parallel to BC.



Q10. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that AB + CD = AD + BC



### SHORT ANSWER TYPE QUESTION- (3marks)

Q1. If a number of circles touch a given line segment PQ at a point A, then where will the centers of all circle lie?



Q2. AB is a diameter of a circle and AC is its chord such that <BAC = 30°. If the tangent at C intersect AB extended at D, then show that BC = BD.



Q3. What is the length of the tangent PQ at a point P of a circle of radius 12cm meets a line through the Centre O at a point Q so that OQ = 20 cm.?

Q4. There are two concentric circle with center O of radii 5cm and 3cm. From an external point P, tangent PA and PB are drawn to these circles. If AP= 12cm, Find the length of BP.



Q5. If PA and PB are tangents from an external point P to a circle with center O. LN touches the circle at M. Prove that PL + LM = PN + MN.



Q6. From an external point P, tangents PA = PB are drawn to a circle with Centre O. If  $\angle PAB = 50^{\circ}$ , then find  $\angle AOB$ .

Q7. Out of the two concentric circles, the radius of the outer circle is 10 cm and the chord AC of length 16 cm is a tangent to the inner circle. Find the radius of the inner circle.



Q8. Two tangents PQ and PR are drawn from an external point to a circle with Centre O. Prove that QORP is a cyclic quadrilateral.



Q9. In figure, O is the Centre of a circle of radius 8 cm, T is a point such that 0T=17 cm and 0T intersects the circle at E. If AB is the tangent to the circle at E, find the length of AB.



Q10. The tangent at a point C of a circle and a diameter AB when extended intersect at P. If  $\angle$ PCA = 120°, Find  $\angle$ CBA.



#### **LONG ANSWER TYPE QUESTIONS :**(4marks)

Q1. A chord PQ of a circle is parallel to the tangent drawn at a point R of the circle. Prove that R bisects the arc PRQ.



Q2. If tangent PQ and PR are drawn from an external point P to a circle with Centre O, such that  $\angle RPQ = 30^{\circ}$ . A chord RS is drawn parallel to the tangent PQ. Find  $\angle RQS$ .



Q3. If tangents PA and PB from a point P to a circle with Centre O are inclined to each other at an angle of  $60^{\circ}$ , then find < POA.

Q4. Two tangents TP and TQ are drawn to a circle with Centre O from an external point T. Prove that  $\angle$  PTQ = 2  $\angle$  OPQ.



Q5Prove that the parallelogram circumscribing a circle is a rhombus.

Q6. If a hexagon ABCDEF circumscribes a circle, prove that AB + CD + EF = BC + DE + FA.



Q7. Let s denote the semi-perimeter of a triangle ABC in which BC = a, CA = b, AB = c. If a circle touches the sides BC, CA, AB at D, E, F respectively, prove that BD = s - b.



Q8. From an external point P, two tangents, PA and PB are drawn to a circle with Centre O. At onepoint E on the circle tangent is drawn which intersects PA and PB at C and D, respectively. If PA = 20 cm, find the perimeter of the triangle PCD.



Q9. If AB is a chord of a circle with Centre O, AOC is a diameter and AT is the tangent at A as shown in figure. Prove that  $\angle BAT = \angle ACB$ 



Q10. Two circles with centers O and O' of radii 6cm and 8 cm, respectively intersect at two points P and Q such that OP and O'P are tangents to the two circles. Find the length of the common chord PQ.



Q11. In a right triangle ABC in which  $\angle B = 90^\circ$ , a circle is drawn with AB as diameter intersecting the hypotenuse AC at P. Prove that the tangent to the circle at P bisects BC.



Q12. Prove that the tangent drawn at the mid-point of an arc of a circle is parallel to the chord joining the end points of the arc.



Q13. In figure, the common tangent, AB and CD to two circles with centers O and O' intersect at E. Prove that the points O, E, O' are collinear.



Q14. If an isosceles triangle ABC, in which AB = AC = 6 cm, is inscribed in a circle of radius 9 cm, find the area of the triangle.



Q15 A is a point at a distance 13 cm from the Centre 0 of a circle of radius 5 cm. AP and AQ are the tangents to the circle at P and Q. If a tangent BC is drawn at a point R lying on the minor arc PQ to intersect AP at B and AQ at C, find the perimeter of the  $\Delta$ ABC.



### **CASE STUDY BASED QUESTIONS**

### CASE STUDY 1:

A Ferris wheel (or a big wheel in the United Kingdom) is an amusement ride consisting of a rotating upright wheel with multiple passenger-carrying components (commonly referred to as passenger cars, cabins, tubs, capsules, gondolas, or pods) attached to the rim in such a way that as the wheel turns, they are kept upright, usually by gravity.

After taking a ride in Ferris wheel, Aarti came out from the crowd and was observing her friends who were enjoying the ride. She was curious about the different angles and measures that the wheel will form. She forms the figure as given below.



a) 60° b) 75° c) 100 ° d) 30° 4. Find ∠ORP a) 90° b) 70° c) 100° d) 60°

### CASE STUDY 2:

Varun has been selected by his School to design logo for Sports Day T-shirts for students and staff . The logo design is as given in the figure and he is working on the fonts and different colours according to the theme. In given figure, a circle with center O is inscribed in a  $\triangle$ ABC, such that it touches the sides AB, BC and CA at points D, E and F respectively. The lengths of sides AB, BC and CA are 12 cm, 8 cm and 10 cm respectively.





1. Find the length of AD

- a) 7
- b) 8
- c) 5
- d) 9

2. Find the Length of BE

- a) 8
- b) 5
- c) 2
- d) 9

3. Find the length of CF

- a) 9
- b) 5
- c) 2
- d) 3

4. If radius of the circle is 4cm, Find the area of  $\Delta OAB$ 

- a) 20
  b) 36
  c) 24
  d) 48
  5. Find area of ΔABC
  a) 50
  - a) 50
  - b) 60
  - c) 100
  - d) 90

## CASE STUDY 3:

There girls Reshma, Salma, Mandeep are playing a game by standing on a circle. Reshma throws a ball to Salma, Salma to Mandeep, Mandeep to Reshma. The distance between Reshma and Mandeep is 6m, and between Reshma and Salma is 8m if O is the center of the circle, then



# **Circles (Answer key)**

# SHORT ANSWER TYPE QUESTIONS(2marks)

- 1. 17cm
- 2. 15cm
- 3. 70°
- 4. 7cm
- 7.120°
- 8.  $a\sqrt{2}$

# **SHORT ANSWERTYPE QUESTIONS (3 marks)**

- 1. Perpendicular line of PQ True
- 3. 16cm
- 4.  $4\sqrt{10} \ cm$
- 6.  $100^{\circ}$
- 7. DO=6cm
- 9. 48/5cm
- 10. 60°

### LONG ANSWER TYPE QUESTION (4 marks)

- 2. ∠RQS=75°
- 3. ∠POA =60°
- 8. 40cm
- 10. pq= 9.6cm
- 14.  $8\sqrt{2} \ cm^2$
- 15. 24cm

### **CASE BASED QUESTIONS**

### CASE STUDY 1:

- 1. c) 150°
- 2. a) 75°
- 3. b) 75°
- 4. a) 90°

# CASE STUDY 2:

1. a) 7 2. b) 5 3. d) 3 4. c) 24 5. b) 60

# CASE STUDY 3:

1: - c) 10m 2: -b) 90° 3: -c) 24 cm<sup>2</sup> 4: -d) 10m 5: - 5m