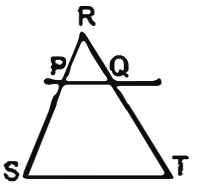
MATHEMATICS : GEOMETRY -II

Time : 2.30 Hrs.) **Question Paper : March 2010** **(Max. Marks : 60**

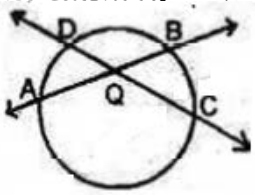
Q. 1. Solve any six sub-questions. **(12)**

(i) In the figure given below, line PQ ∥ side ST, R-P-S and R-Q-T, RP = 6, PS = 9, RQ = 8, find QT.



(ii) Sides of triangle are 8 cm, 17 cm and 15 cm. Determine whether the triangle is a right-angled triangle or not.

(iii) If two circles with centres A and B and radii 5 cm and 8 cm respectively touch each other externally. Find the distance between A and B.

(iv) 

In the figure given below, chords AB and CD of a circle intersect in point Q in the interior of a circle. If m(arc AD) = 35° and m(arc BC) = 47°, then find m∠BQC.

(v) Construct and equilateral triangle ABC of side 6.5 cm. Draw perpendicular bisectors of any two sides of ΔABC. (Do not write the steps of the construction.)

(vi) If $\cot A = \frac{20}{21}$, then find the value of cosec A.

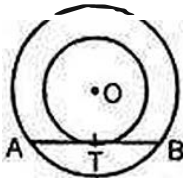
(vii) What is the volume of a cube with side 4 cm ?

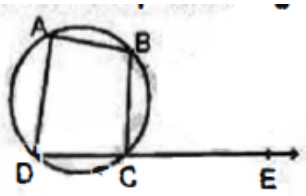
(viii) Find the co-ordinates of the mid-point of the segment joining the points (0, 4) and (10, 12).

Q. 2. Solve any four sub-questions. **(12)**

(i) In ΔRST, m∠S = 90°, m∠T = 30°, RT = 10. Find RS and ST.

(ii) In the figure given below, two concentric circles with centre O are given and line AB is tangent to the smaller circle at T. Show that T is the mid-point of seg AB.



(iii) 

In the figure given below, side DC of a cyclic quadrilateral ABCD is produced to a point E. Prove that : m∠BCE = m∠BAD.

(iv) Draw tangents to a circle with centre 'A' and radius 2.9 cm from a point B at a distance 5 cm from the centre. (Do not write the steps of the construction.)

(v) Evaluate : $\frac{3\sin 58}{\cos 32} - \frac{\sec 39}{\operatorname{cosec} 51}$.

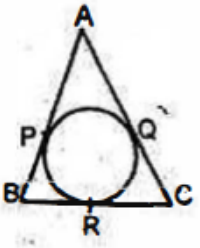
(vi) What is the volume of a cylinder with radius 15 cm and height 28 cm ? $\left(\text{Given } \pi = \frac{22}{7}\right)$

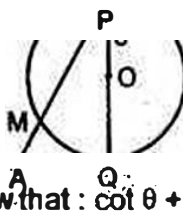
Q. 3. Solve any four sub-questions. **(12)**

(i) Areas of two similar triangles are 225 cm² and 81 cm². If one side of the smaller triangle is 12 cm, then find the corresponding side of the larger triangle.

(ii) In ΔPQR, M is a mid-point of side QR. IF PQ = 11, QR = 12 and PR = 17, then find the length of seg PM.

(iii) In the figure given below, ΔABC is an isosceles triangle with perimeter 44 cm. The base BC is of length 12 cm. Sides AB and AC are congruent. A circle touches the three sides as shown. Find the length of a tangent segment from A to the circle.



(iv) 

In the figure given below, O is the centre of a circle, segment PQ is diameter, line AQ is a tangent. If OP = 3 and m (arc PM) = 120°, determine AP.

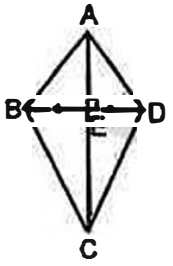
(v) Show that : $\cot\theta + \tan\theta = \text{cosec}\,\theta \cdot \sec\theta$

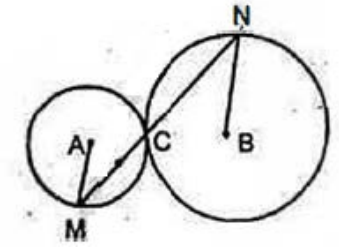
(vi) If A = (3, 4) and B = (8, -1), find the coordinates of R so that 3AR = 2RB.

Q. 4. Solve any three sub-questions. **(12)**

(i) The volume of a sphere is $\frac{4312}{3}$ cm^3, find its radius and surface area. $\left(\text{Given } \pi = \frac{22}{7}\right)$

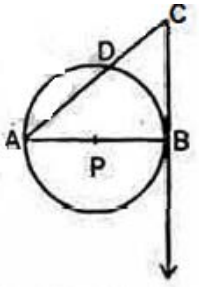
(ii) In the figure given below diagonal AC is the perpendicular bisector of diagonal BD. BD = 16 cm, AB = 10 cm and BC = 17 cm. Find the length of diagonal AC.



(iii) 

In the figure given below two circles centred at A and B are touching at C. Line passing through C intersects two circles at M and N respectively. Show that AM ∥ BN.

(iv) In the figure given below AB be the diameter of a circle with centre P. Let line CB be a tangent and line ADC ADC a secant. Prove that AC x AD = 4 (radius)^2.



(v) Construct Δ PQR such that QR = 8.6 cm, m∠P = 70° and median PM = 5.2 cm. (Do not write the steps of construction.)

(vi) Prove that : If a line parallel to a side of a triangle intersects other sides in two distinct points, then the other sides are divided in the same ratio by it.

Q. 5. Solve any three sub-questions. **(12)**

(i) Bisectors of ∠B and ∠C and ΔABC meet each other at P. Line AP cuts the side BC at Q, then prove that : $\frac{AP}{PQ} = \frac{AB + AC}{BC}$

(ii) The angle of elevation of the top of a tower from a point on the ground is 30°. After walking 30 metres towards the tower, the angle of elevation becomes 60°. What is the height of the tower ?

(iii) Construct Δ PQR such that PQ = 5 cm, QR = 6.2 cm, PR = 6.7 cm and draw its circumcircle. Draw tangents to the circle at P and R. (without using centre.) (Do not write the steps of the construction.)

(iv) If PAB is a secant to a circle intersecting at points A and B and PT is a tangent, then prove that PA x PB = PT^2.

(v) The lower part of a toy is right circular cylindrical and its upper part is conical. The diameter of its base is 8 cm and height of the cylindrical part is 5 cm. If the total height of the toy is 8 cm, find the area of the curved surface of the toy. (Given π = 3.14)

(vi) M (-3, 7) and N (-1, 6) are the points of trisection of segment AB, where A-M-N-B. Find the co-ordinates of A and B.