GEOMETRY

Question Paper: March 2012

Time Duration: 2 Hrs 30 Mins **Maximum Marks:60**

Note :—

(*i*) *All* questions are compulsory. Draw the figure wherever necessary.

(*ii*) Marks of constructions should be distinct. They should not be rubbed off.

(*iii*) Do not use calculator.

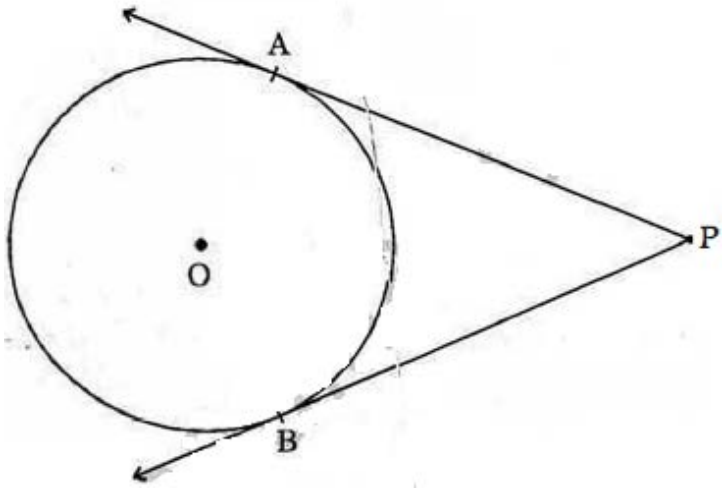
(*iv*) Figure is necessary for the proof of the theorem.

1. Solve any *six* sub-questions 6

(*i*) If the angle $\theta = -60°$, find the value of $\sin \theta$.

(*ii*) Find the side of a square whose diagonal is $16\sqrt{2}$ cm.

(*iii*) In the following figure, O is the centre of the circle. PA and PB are the tangents to the circle at points A and B respectively. If $\ell(PA) = 7$ cm, then find $\ell(PB)$.



(*iv*) State the slope and y-intercept of the line $y = 3x - 5$.

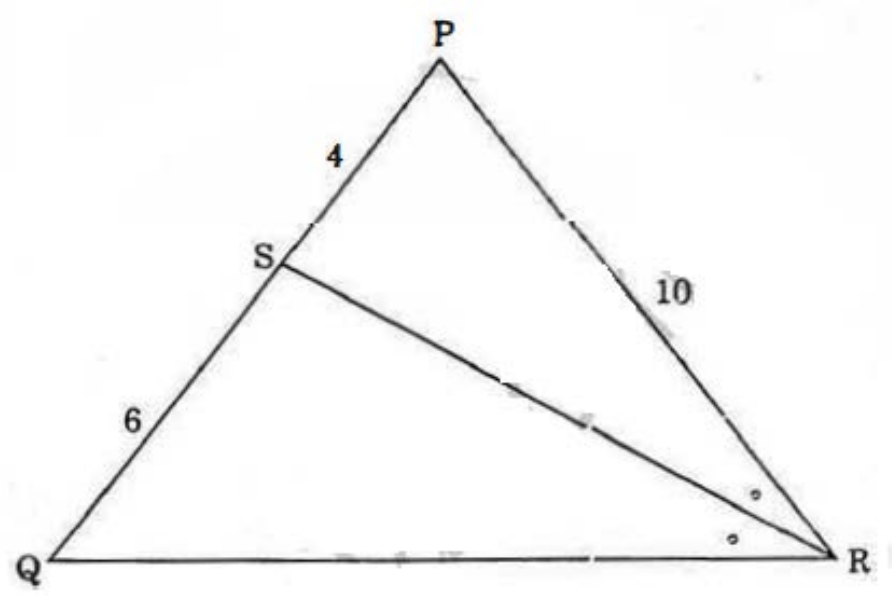
(*v*) Find the total surface area of a cube with side 1 metre.

(*vi*) Two circles with radii 4 cm and 3 cm touch each other externally. Find the distance between their centres.

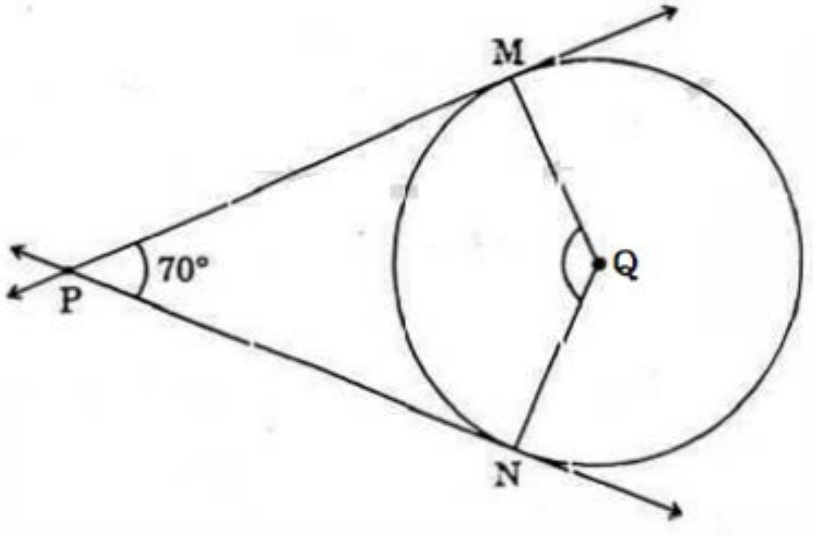
(*vii*) If F = 6, V = 8. Using Euler's formula, find the value of E.

2. Solve any *five* sub-questions : 10

(*i*) In the figure given below in Δ PQR, seg RS is the angle bisector of $\angle$ PRQ. If PS = 4, SQ = 6, PR = 10, find QR.



(*ii*) In the following figure, Q is the centre of the circle. Line PM and line PN are tangents to the circle. If $\angle$ MPN = 70°, then find $\angle$ MQN.



(*iii*) If $\sin\theta = \frac{5}{13}$, where θ is acute angle, find the value of $\cos\theta$.

(*iv*) If a sector of a circle with radius 10 cm has central angle 18°. Find the area of the sector. ($\pi = 3.14$)

(*v*) Convert the following equation into $y = mx + c$ form and find the slope

$$\frac{x}{3} + \frac{y}{2} = 1$$

(*vi*) Eliminate θ, if :

$$x = p \sec\theta,\ y = q \tan\theta.$$

3. Solve any *four* sub-questions : 12

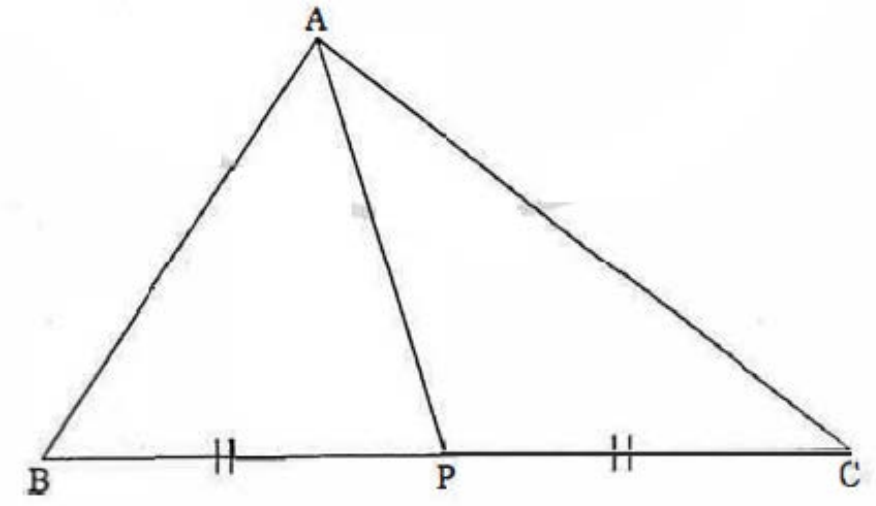
(*i*) Curved surface area of a cone with base radius 20 cm is 500 π sq. cm. Find the height of the cone.

(*ii*) Construct the circumcircle of equilateral Δ PQR with side 6.3 cm.

(*iii*) Find the value of K if A(4, 11), B(2, 5), C(6, K) are collinear points.

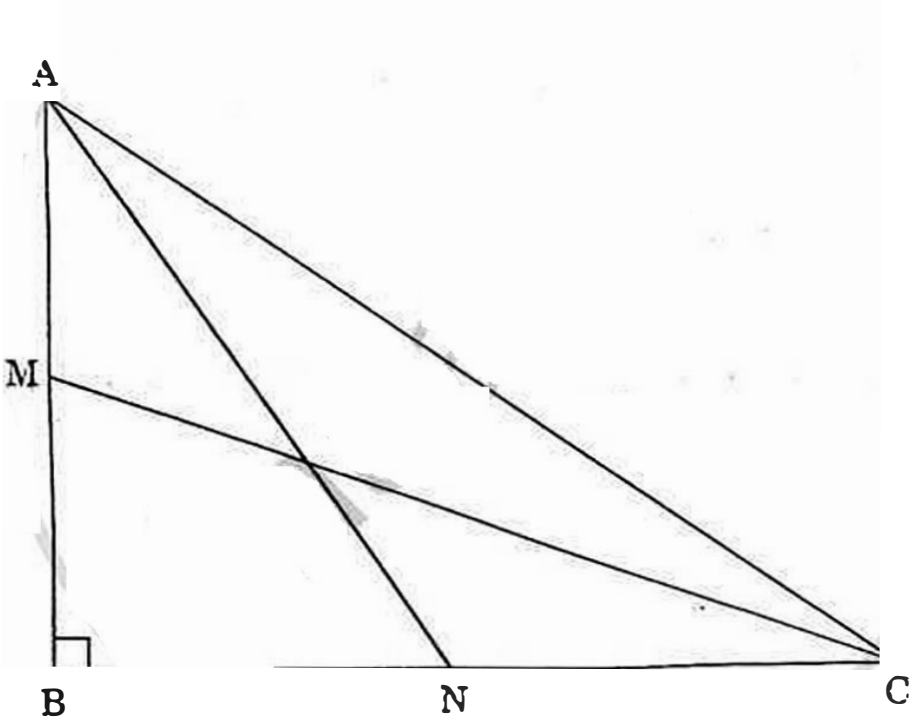
(*iv*) A boy is at a distance of 40 metres from a tree and makes an angle of elevation of 60° with the top of the tree. What is the height of the tree ?

(*v*) In the following figure, in Δ ABC, AP is the median. If AP = 12, $AB^2 + AC^2 = 320$, then find BC.



4. Solve any *three* sub-questions : 12

(*i*) Seg AN and seg CM are the medians of Δ ABC in which $\angle$ B = 90°. Prove that $4(AN^2 + CM^2) = 5AC^2$.



(*ii*) Prove that the opposite angles of a cyclic quadrilateral are supplementary.

(*iii*) Construct Δ LMN such that LM = 6.6 cm, $\angle$ LNM = 65° and ND is median and ND = 5 cm.

(*iv*) From the top of a lighthouse 120 m high two ships [illegible] side of the lighthouse are observed. The angles of depression of the ships as seen from the lighthouse are found to be 30° and 60°. Find the distance between the two ships. (Assume that the two ships and bottom of the lighthouse are in a line.)

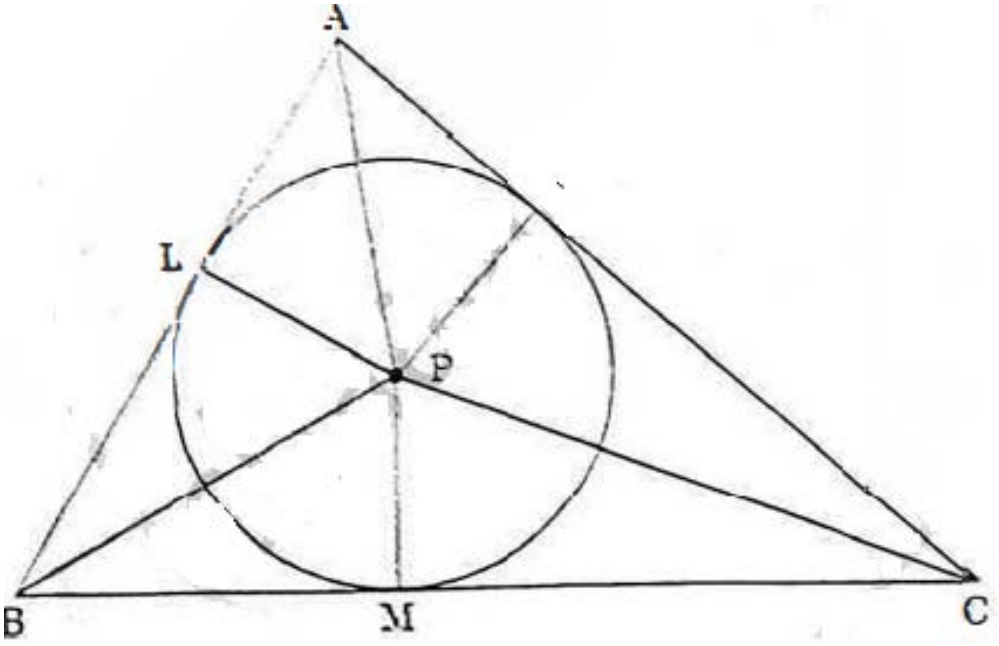
5. Solve any *four* sub-questions

(*i*) A(5, 4), B(–3, –2) and C(1, –8) are the vertices of a triangle ABC. Find the equation of median AD and equation of line parallel to AC passing through point B.

(*ii*) Δ AMT ~ Δ AHE. In Δ AMT, AM = 6.3 cm, ∠ MAT = 120°, AT = 4.9 cm and $\frac{MA}{HA} = \frac{7}{5}$ Construct Δ AHE. Write l(AH) and l(AE).

(*iii*) Prove that the ratio of areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

(iv) In the following figure, the inscribed circle of Δ ABC with centre P touches the sides AB, BC and AC at points L, M, N respectively. Show that A(Δ ABC) = $\frac{1}{2}$ × perimeter of Δ ABC) × (radius of inscribed circle).



(v) A cuboidal shape vessel with dimensions 44 cm × 35 cm × 20 cm is filled with water upto the height of 17 cm. A spherical solid metal ball is placed into the vessel; due to this 231 cm^3 water overflows. Find the radius of the ball. $\left(\pi = \frac{22}{7}\right)$