MT

2017 ___ ___ 1100   Seat No.

MT - GEOMETRY - SEMI PRELIM - II : PAPER - 1

Time : 2 Hours   **(Pages 4)**   **Max. Marks : 40**
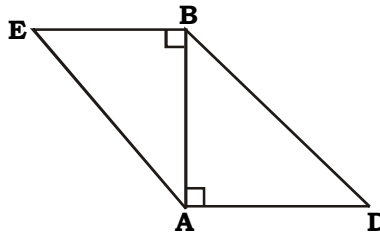
Note :

  (i) All questions are compulsory.

  (ii) Use of calculator is not allowed.
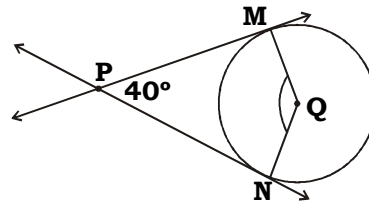
Q.1. Solve ANY FIVE of the following :   **5**

  (i) In the adjoining figure,
       seg BE $\perp$ seg AB and
   seg BA $\perp$ seg AD.
       If BE = 6 and AD = 9

       find $\dfrac{A \, (\cup ABE)}{A \, (\cup ABD)}$

  (ii) In the adjoining figure,
        Q is the centre of circle and PM
        and PN are tangent segments to
        the circle. If $\angle MPN = 40°$,
        find $\angle MQN$.

  (iii) Using Euler's formula, find F, if V = 6 and E = 12.

  (iv) If two circles touch externally then show that the distance between
         their centres is equal to the sum of their radii.

  (v) Ray YM is the angle bisector
       of $\angle XYZ$, where XY = YZ.
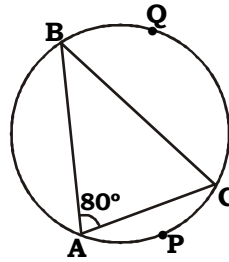   Find the relation between XM and MZ.
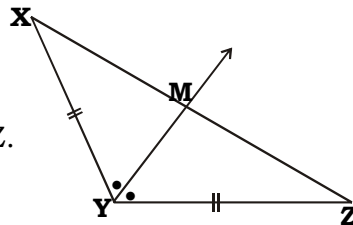
  (vi) A cylinder and a cone have equal radii and equal heights. If the
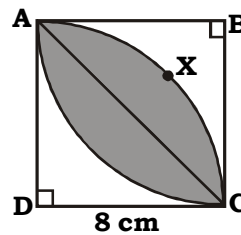   volume of the cylinder is 300 cm^3, what is the volume of the cone ?

Q.2. Solve ANY FOUR of the following :   **8**

(i)   In the adjoining figure,
       if m (arc APC) = 60°
       and m ∠BAC = 80°
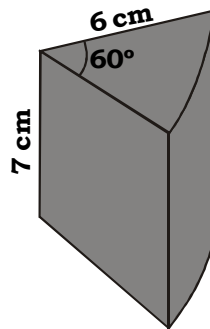   Find (a) ∠ABC (b) m (arc BQC).

(ii)   Calculate the area of the shaded
       region in the adjoining figure where
       ▢ABCD is a square with side 8 cm each.
       (f = 3.14)
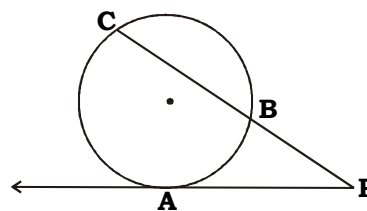
(iii) D is a point on side BC of ∆ABC such that ∠ADC = ∠BAC. Show that
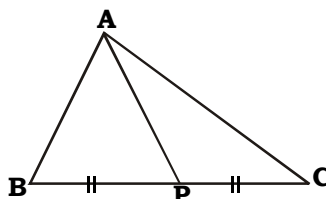 $AC^2 = BC \times DC$.

(iv)   A piece of cheese is cut in the
       shape of the sector of a circle of
       radius 6 cm. The thickness of the
       cheese is 7 cm. Find the curved
       surface area of the cheese.

(v)   In the adjoining figure,
       a tangent segment PA
       touching a circle at A and
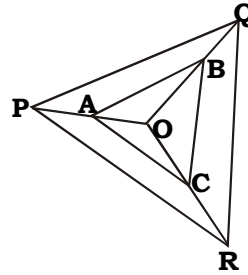   a secant PBC are shown.
       If AP = 15 and BP = 10,find BC.

(vi)   In ∆ABC, AP is a median.
       If AP = 7, $AB^2 + AC^2 = 260$
   then find BC.

Q.3. Solve ANY THREE of the following :   9

(i) In the adjoining figure,
points A, B and C are on
seg OP, seg OQ and seg OR respectively
such that AB || PQ and AC || PR.
Then show that BC || QR.

(ii) The curved surface area of the frustum of a cone is 180 sq. cm and the circumference of its circular bases are 18 cm and 6 cm respectively. Find the slant height of the frustum of a cone.

(iii) Suppose ABC is a triangle inscribed in a circle, the bisector of $\angle$ABC intersects the circle again in D, the tangent at D intersect the line BA and line BC in E and F respectively. Prove that $\angle$EDA $\cong$ $\angle$FDC.

(iv) Triangle ABC has sides of length 5, 6 and 7 units while $\triangle$PQR has perimeter of 360 units. If $\triangle$ABC is similar to $\triangle$PQR then find the sides of $\triangle$PQR.
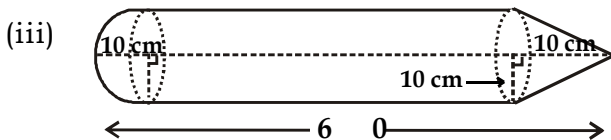
(v) $\square$ABCD is a parallelogram.
A circle passing through D, A,
B cuts BC in P.
Prove that DC = DP.
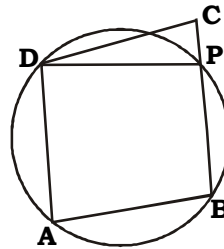
Q.4. Solve ANY TWO of the following :   8

(i) Prove that : The ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.

(ii) Prove that : The opposite angles of a cyclic quadrilateral are supplementary.

(iii)

A toy is a combination of a cylinder, hemisphere and a cone, each with radius 10cm. Height of the conical part is 10 cm and total height is 60 cm. Find the total surface area of the toy.
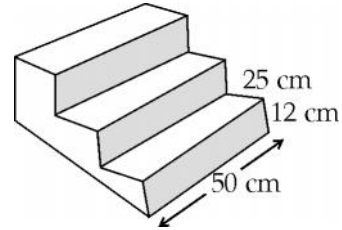(π = 3.14, $\sqrt{2}$ = 1.41)

Q.5. **Solve ANY TWO of the following :**   **10**

(i) $\triangle ABC$ is a triangle where $\angle C = 90°$. Let $BC = a$, $CA = b$, $AB = c$ and let 'p' be the length of the perpendicular from C on AB. Prove that

(a) $cp = ab$, (b) $\dfrac{1}{p^2} = \dfrac{1}{a^2} + \dfrac{1}{b^2}$

(ii) There are 3 stair-steps as shown in the figure. Each stair-step has width 25 cm, height 12 cm and length 50 cm. How many bricks have been used in it if each brick is 12.5 cm × 6.25 cm × 4 cm ?

(iii) If two circles are internally touching at point P. A line intersects those two circles in point A, B, C, D respectively, then prove that $\angle APB \, \emptyset \, \angle CPD$.

Best Of Luck 👍