$$= \frac{1}{4} \times \frac{22}{7} \times \frac{35}{10} \times \frac{35}{10} = \frac{77}{8} cm^2$$

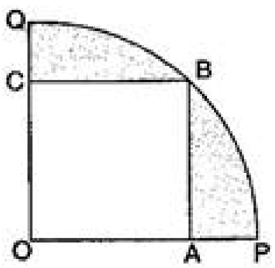
(ii) Area of shaded region = Area of quadrant OACB – Area of Δ OBD

$$= \frac{77}{8} - \frac{OB \times OD}{2}$$

$$= \frac{77}{8} - \frac{3.5 \times 2}{2}$$

$$= \frac{77}{8} - \frac{35}{10} = \frac{49}{8} \text{ cm}^2$$

Q13. In figure, a square OABC is inscribed in a quadrant OPBQ. If OA = 20 cm, find the area of the shaded region. $(\text{Use } \pi = 3.14)$



Ans. OB = $\sqrt{OA^2 + AB^2}$

$= \sqrt{OA^2 + OA^2}$

$= \sqrt{2}$ OA = $\sqrt{2} \times 20 = 20\sqrt{2}$ cm

Area of shaded region = Area of quadrant OPBQ – Area of square OABC

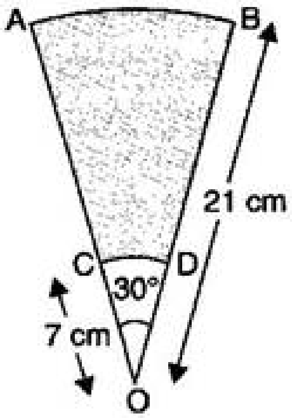
$= \frac{90^\circ}{360^\circ} \times 3.14\left(20\sqrt{2}\right)^2 - 20 \times 20$

$= \frac{1}{4} \times 3.14 \times 800 - 400$

$= 200 \times 3.14 - 400$

$= 228\ cm^2$

Q14. AB and CD are respectively arcs of two concentric circles of radii 21 cm and 7 cm and centre O (see figure). If $\angle$ AOB = 30°, find the area of the shaded region.



Ans. Area of shaded region = Area of sector OAB – Area of sector OCD

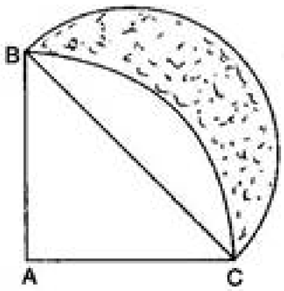
$= \frac{30^\circ}{360^\circ} \times \frac{22}{7} \times 21 \times 21 - \frac{30^\circ}{360^\circ} \times \frac{22}{7} \times 7 \times 7$

$= \frac{1}{12} \times \frac{22}{7} \times 21 \times 21 - \frac{1}{12} \times \frac{22}{7} \times 7 \times 7$

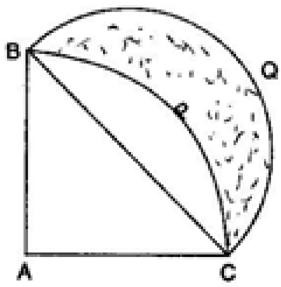
$= \frac{231}{2} - \frac{77}{6} = \frac{692 - 77}{6}$

$= \frac{616}{6} = \frac{308}{3}\ cm^2$

Q15. In figure, ABC is a quadrant of a circle of radius 14 cm and a semicircle is drawn with BC as diameter. Find the area of the shaded region.



Ans. In right triangle BAC, $BC^2 = AB^2 + AC^2$ [Pythagoras theorem]



$\Rightarrow BC^2 = (14)^2 + (14)^2 = 2(14)^2$

$\Rightarrow$ BC = $14\sqrt{2}$ cm

$\therefore$ Radius of the semicircle = $\frac{14\sqrt{2}}{2} = 7\sqrt{2}$ cm

$\therefore$ Required area = Area BPCQB

= Area BCQB – Area BCPB

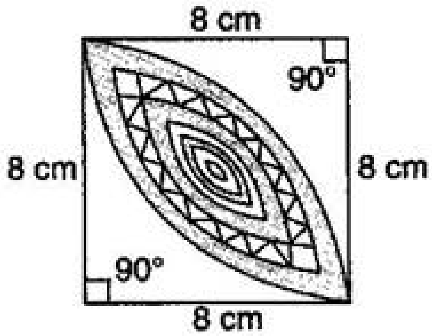
= Area BCQB – (Area BACPB – Area Δ BAC)

$$= \frac{180°}{360°} \times \frac{22}{7}\left(7\sqrt{2}\right)^2 - \left[\frac{90°}{360°} \times \frac{22}{7} \times (14)^2 - \frac{14 \times 14}{2}\right]$$

$$= \frac{1}{2} \times \frac{22}{7} \times 98 - \left(\frac{1}{4} \times \frac{22}{7} \times 196 - 98\right)$$

$$= 154 - (154 - 98) = 98\ cm^2$$

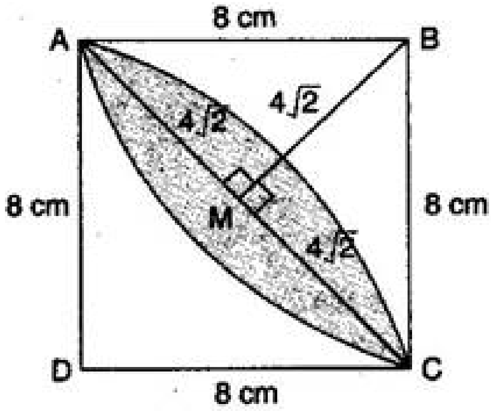
Q16. Calculate the area of the designed region in figure common between the two quadrants of circles of radius 8 cm each.



Ans. In right triangle ADC, $AC^2 = AD^2 + CD^2$ [Pythagoras theorem]

$\Rightarrow$ $AC^2 = (8)^2 + (8)^2 = 2(8)^2$

$\Rightarrow$ $AC = \sqrt{128} = 8\sqrt{2}$ cm



Draw BM $\perp$ AC.

Then AM = MC = $\frac{1}{2}$ AC = $\frac{1}{2} \times 8\sqrt{2}$ = $4\sqrt{2}$ cm

In right triangle AMB,

$AB^2 = AM^2 + BM^2$ [Pythagoras theorem]

$\Rightarrow (8)^2 = \left(4\sqrt{2}\right)^2 + BM^2$

$\Rightarrow BM^2 = 64 - 32 = 32$

$\Rightarrow$ BM = $4\sqrt{2}$ cm

$\therefore$ Area of Δ ABC = $\frac{1}{2} \times AC \times BM$

$= \dfrac{8\sqrt{2} \times 4\sqrt{2}}{2} = 32\ cm^2$

$\therefore$ Half Area of shaded region

$= \dfrac{90^\circ}{360^\circ} \times \dfrac{22}{7} \times (8)^2 - 32$

$= 16 \times \dfrac{22}{7} - 32 = \dfrac{128}{7} cm^2$

$\therefore$ Area of designed region

$= 2 \times \dfrac{128}{7} = \dfrac{256}{7} cm^2$

*********** END **********