

Question 3. DEF is the pedal triangle of ABC; prove that the radius of its circumcircle is  $2R$ .

Solution.

Let a Point **P** inside the  $\triangle ABC$  and draw  $PD \perp BC, PE \perp AC, PF \perp AB$   
 $\therefore \triangle DEF$  be the pedal triangle of  $\triangle ABC$

Now, we know that the circum-radius of a triangle is given by:

$$= \frac{a}{2 \sin A}$$

$$\text{So radius of circumcircle of } \triangle DEF = \frac{a \cos A}{2 \sin(180^\circ - 2A)}$$

$$\begin{aligned} &= \frac{a \cos A}{4 \sin A \cos A} \\ &= \frac{a}{4 \sin A} \\ &= \frac{1}{2} R \end{aligned}$$