

3) If  $\Delta = \begin{vmatrix} 0 & b-a & c-a \\ a-b & 0 & c-b \\ a-c & b-c & 0 \end{vmatrix}$ , then show that  $\Delta$  is equal to zero.

Solution: Interchanging rows and columns, we get  $\Delta = \begin{vmatrix} 0 & a-b & a-c \\ b-a & 0 & b-c \\ c-a & c-b & 0 \end{vmatrix}$

Taking  $(-1)^3$  common from  $R_1, R_2$  and  $R_3$ , we get

$$\Delta = (-1)^3 \begin{vmatrix} 0 & b-a & c-a \\ a-b & 0 & c-b \\ a-c & b-c & 0 \end{vmatrix} = -\Delta$$

$$\Rightarrow 2\Delta = 0 \quad \text{or} \quad \Delta = 0$$