55. The determinant $\begin{vmatrix} \sin \mathbf{A} & \cos \mathbf{A} & \sin \mathbf{A}+\cos \mathbf{B} \\ \sin \mathbf{B} & \cos \mathbf{A} & \sin \mathbf{B}+\cos \mathbf{B} \\ \sin \mathbf{C} & \cos \mathbf{A} & \sin \mathbf{C}+\cos \mathbf{B} \end{vmatrix}$ **is equal to zero.**

Ans: Here, we have $\begin{vmatrix} \sin A & \cos A & \sin A+\cos B \\ \sin B & \cos A & \sin B+\cos B \\ \sin C & \cos A & \sin C+\cos B \end{vmatrix}$

$$= \begin{vmatrix} \sin A & \cos A & \sin A \\ \sin B & \cos A & \sin B \\ \sin C & \cos A & \sin C \end{vmatrix} + \begin{vmatrix} \sin A & \cos A & \cos B \\ \sin B & \cos A & \cos B \\ \sin C & \cos A & \cos B \end{vmatrix}$$

Since, the value of the determinant having two identical rows and columns is zero. Therefore,

$$= 0 + \begin{vmatrix} \sin A & \cos A & \cos B \\ \sin B & \cos A & \cos B \\ \sin C & \cos A & \cos B \end{vmatrix}$$

$$= \begin{vmatrix} \sin A & \cos A & \cos B \\ \sin B & \cos A & \cos B \\ \sin C & \cos A & \cos B \end{vmatrix}$$

Taking common $\cos A$ and $\cos B$ from C_2 and C_3

$$= \cos A.\cos B \begin{vmatrix} sinA & 1 & 1 \\ sinB & 1 & 1 \\ sinC & 1 & 1 \end{vmatrix}$$

$$= 0$$

Since, the value of the determinant having two identical rows and columns is zero.

Hence, the given statement is true.