Step-1

Given that $A=\begin{bmatrix}0&0&1\\1&0&0\\0&1&0\end{bmatrix}$, $B=\begin{bmatrix}0&1&1\\1&0&1\\1&1&0\end{bmatrix}$ and $C=\begin{bmatrix}1&1&1\\1&1&1\\1&1&1\end{bmatrix}$.

We need to find out whether the given matrices have determinants $0,1,2,\text{ or }3$.

Step-2

Consider

$\det(A)=|A|$

$=\begin{vmatrix}0&0&1\\1&0&0\\0&1&0\end{vmatrix}$

$=-\begin{vmatrix}1&0&0\\0&0&1\\0&1&0\end{vmatrix}$

$=\begin{vmatrix}1&0&0\\0&1&0\\0&0&1\end{vmatrix}$ (Since determinant changes sign when two rows are exchanged)

=1 (Since the determinant of the identify matrix is 1)

Thus, $\boxed{\det(A)=1}$

Step-3

Consider

$\det(B)=|B|$

$=\begin{vmatrix}0&1&1\\1&0&1\\1&1&0\end{vmatrix}$

We find $\det(B)$ by cofactor expansion along the first row.

Therefore,

$$\det B = \begin{vmatrix} 1 & 1 \\ 1 & 0 \end{vmatrix} - \begin{vmatrix} 1 & 0 \\ 1 & 1 \end{vmatrix}$$

$$= (-1) - (1)$$
$$= -2$$

Thus, $\boxed{\det B = -2}$

Step-4

Consider

$$\det C = |C|$$

$$= \begin{vmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{vmatrix}$$

= 0 (Since the rows of the matrix C are identical)

Thus, $\boxed{\det C = 0}$

Thus, out of the 3 matrices A, B and C, only A and C have the determinants 1 and 0.