

3) If $w (\neq 1)$ is a cube root of unity then

$$\begin{vmatrix} 1 & 1+i+w^2 & w^2 \\ 1-i & -1 & w^2-1 \\ -i & -i+w-1 & -1 \end{vmatrix} = \quad [1995 \text{ S}]$$

(a) 0

(b) 1

(c) i

(d) w

Solution:

$$(a) \begin{vmatrix} 1 & 1+i+w^2 & w^2 \\ 1-i & -1 & w^2-1 \\ -i & -i+w-1 & -1 \end{vmatrix}$$

$$= \begin{vmatrix} 0 & 0 & 0 \\ 1-i & -1 & w^2-1 \\ -i & -i+w-1 & -1 \end{vmatrix}$$

$$(\because 1+w+w^2=0)$$

$$[R_1 \rightarrow R_1 - R_2 + R_3]$$

$$= \boxed{0}$$