

$$A = \begin{bmatrix} a & -1 & 4 \\ 0 & b & 7 \\ 0 & 0 & 3 \end{bmatrix}$$

Sum of eigen values = 10 = trace of A

$$\Rightarrow a + b + 3 = 10$$

$$\Rightarrow a + b = 7 \quad \text{--- (1)}$$

now $|A| = \begin{vmatrix} a & -1 & 4 \\ 0 & b & 7 \\ 0 & 0 & 3 \end{vmatrix}$

$$= a(3b - 0) + 1(0 - 0) - 4(0 - 0)$$

$$= 3ab$$

∴ determinant of A = product of eigen values of A

$$\Rightarrow 3ab = 30$$

$$ab = 10$$

now $(a+b)^2 = a^2 + b^2 + 2ab$

$$\Rightarrow (7)^2 = a^2 + b^2 + 2(10)$$

$$49 = a^2 + b^2 + 20$$

$$\Rightarrow a^2 + b^2 = 29 \quad \text{Ans}$$