Ans-6 (b)

Ans-6) b) Proving AU is an eigenvector of Q with eigen-value λ, given U is eigenvector of P with eigen-value λ.

$$Pu = \lambda u \qquad (P = A^T A)$$

$$\Rightarrow A^T A u = \lambda u$$

$$\Rightarrow A A^T (AU) = \lambda (AU) \qquad \text{(Multiplying by } A \text{ on both sides)}$$

$$\Rightarrow Q(AU) = \lambda (AU) \qquad (Q = AA^T)$$

Hence, Au is an eigenvector of Q with eigenvalue λ.

Proving $A^T v$ is an eigenvector of P with eigenvalue μ. given v is an eigenvector of Q with eigenvalue μ.

$$Qv = \mu v$$

$$\Rightarrow AA^T v = \mu v$$

$$\Rightarrow (A^T A)(A^T v) = \mu (A^T v)$$

$$\Rightarrow P(A^T v) = \mu (A^T v)$$

Hence $A^T v$ is an eigenvector of P with eigenvalue μ.

No. of elements in u-: n

No. of elements in v-: m