Step-1

Let A is symmetric positive definite and Q is an orthogonal matrix.

If Q is an orthogonal matrix, therefore, Q must contain eigenvectors of A.

Hence, $Q^T AQ$ is not a diagonal matrix.

(a) $\boxed{\text{false}}$

Step-2

(b)

The matrix Q is an orthogonal,

Implies;

$$\begin{aligned} Q^T Q &= QQ^T \\ &= I \end{aligned}$$

Therefore,

$$Q^T = Q^{-1}$$

Thus,

$$Q^T AQ = A$$
$$Q^{-1}AQ = A$$

Therefore, the eigenvalues of A are equal to eigenvalues of $Q^T AQ$.

Since, A is symmetric positive definite implies $Q^T AQ$ is also symmetric positive definite

Thus, $\boxed{(\text{b})\,\text{True}}$

Step-3

(c)

As, the eigenvalues of A are equal to eigenvalues of $Q^T AQ$

Hence, statement is $\boxed{\text{true}}$

Step-4

(d)

If λ is the Eigen value of A

Then $e^{-\lambda}$ is the Eigen value of e^{-A}

And it is known that $e^{-\lambda} \geq 0$ for any value of λ

Thus,

e^{-A} is symmetric positive definite;

Hence, statement is $\boxed{\text{true}}$

$\boxed{(\text{a})\text{False}(\text{b})\text{True}(\text{c})\text{True}(\text{d})\text{True}}$.