Q: The state equation of a second order system is
$\dot{\boldsymbol{x}}(t) = A\boldsymbol{x}(t), \quad \boldsymbol{x}(0)$ is the initial condition.
Suppose λ_1 and λ_2 are two distinct eigenvalues of A, and v_1 and v_2 are the corresponding eigenvectors. For constants α_1 and α_2, the solution, $\boldsymbol{x}(t)$, of the state equation is

(A) $\sum_{i=1}^{2} \alpha_i e^{\lambda_i t} v_{\mathbf{i}}$
(B) $\sum_{i=1}^{2} \alpha_i e^{2\lambda_i t} v_{\mathbf{i}}$
(C) $\sum_{i=1}^{2} \alpha_i e^{3\lambda_i t} v_{\mathbf{i}}$
(D) $\sum_{i=1}^{2} \alpha_i e^{4\lambda_i t} v_{\mathbf{i}}$

Solution: $\dot{\boldsymbol{x}}(t) = A\boldsymbol{x}(t)$
If λ is the eigen value of matrix A then $\dot{\boldsymbol{x}}(t) = \lambda\boldsymbol{x}(t)$
As there are 2 eigen values λ_1 and λ_2 of matrix A, the solution of state equation will be,
$x(t) = \sum_{i=1}^{2} \alpha_i e^{\lambda_i t} v_{\mathbf{i}}$
Hence, the correct option is (A).