The study seeks to investigate a failure of laminated composite structure subjected to a thermomechanical loading. Failure analysis of composite structures is an important design requirement. The stacking sequence of the structure investigated is restricted to ten thin layers. The fiber orientation, stacking sequence and material properties influence the response from the composite structure. Formulas are presented which are used to estimate the response of multi-layered composite structure to thermomechanical loads. A failure analysis is performed based on some known failure criteria. The values of the engineering properties for multi-layered composite structure and the results of the stress and strain distributions subjected to the forces and bending moments are presented. The numerical results were computed by using MATLAB script. Selected results of the numerical analysis have been presented.