Biot's poroelastic theory is used with classic plate theory and plane stress theory to determine the constitutive relationships for a thin poroelastic plate. The dynamic equations for the thin poroelastic plate are derived from the extended Hamilton's principle. The dynamic equations are then transformed to frequency domain and Galerkin's finite element method is used to derive the stiffness matrix of a triangular plate element. When impulsive loads and elastic boundary conditions are applied, the finite element frequency domain analysis for the thin poroelastic plates is achieved. Vibration behavior of thin elastic and poroelastic circular plates is accurately predicted.