CHAPTER V

CONCLUSIONS AND RECOMMENDATION

5.1 Conclusions

This thesis is concerned with the flexural behaviour of a circular elastic plate resting on a multi-layered poroelastic half-space subjected to axisymmetric loadings. An application of the exact stiffness matrix scheme and the discritization technique combined with variational scheme are employed to investigate the influence of a number of material parameters and different types of loadings on the quasi-static response of the plate.

The convergence and numerical stability of the present solution scheme with respect to the following parameters ,i.e, the upper limit of numerical integration, ξ_L ; the number of generalized coordinates, N ; the number of ring elements , M , and the penalty number , λ , are first studied. It is found that the numerical solutions are found to be stable when $\xi_L \geq 80$, $N \geq 4$, $M \geq 20$ and $10^{-4} \leq \lambda \leq 10^{-1}$. In addition, the accuracy of the present scheme is confirmed by comparing with the existing studies.

The influence of various material parameters (i.e, Kr , ν, ν_u , κ and h1/a) to the quasi-static behaviour of a circular elastic plate resting on a multi-layered poroelastic half-space are studied. The numerical results indicate that the magnitude of central displacement and bending moment of the plate are depended on the relative rigidity parameter, Kr , whereas the coefficient of permeability, κ, affectes only the rate of consolidation of the plate. Drained and undrained Poisson's ratios as well as the layer thickness of a multi-layered poroelastic half-space have a significant influence on both the magnitude and the rate of consolidation settlement of plate. In the case of $\nu \rightarrow \nu_u$

the multi-layered poroelastic half-space exhibits only elastic deformation and the consolidation feature is absent . In addition , the numerical results indicate that the magnitude of contact stress are depended on the relative rigidity parameter, Kr , and the loading types.

5.2 Recommendation

The present solution scheme can be extended to investigate the case of an elastic plate buried in a multi-layered poroelastic half-space. In addition , the case of impermeable contact surface , i.e , pore pressure under the plate does not vanish , should also be considered .