SYNOPSIS

The response of structures to earthquakes depends upon many factors including earthquake magnitude, intensity and ground conditions. The nature of the ground is by far the most important for a particular earthquake. The response of structure also depends upon the depth of the focus of the earthquake. The moderately deep earthquake is more important since it affects a larger area on the earth. The waves which propagate from the focus of such an earthquake may be assumed more or less plane. These waves propagate and transmit through different layers in the earth before they reach the surface. The problem of propagation and transmission of such waves is a difficult one, because the exact nature of the layers of the earth is not known. One has to consider various models and compare the effects with experimental records. This helps us knowing the nature of the ground and also for future comparison the exact earth model can be chosen. With this in view, in this ~~proposed~~ thesis the propagation and transmission of plane waves through layers of different properties is considered.

The present thesis is divided into four chapters. In the first chapter the classification of waves and the fundamental relations between the stress and strain for different models used in the wave equations are discussed. A brief

historical survey of works done relating to this thesis is also included in this chapter.

In the second chapter the problems on the propagation of Love or Love type waves through a heterogeneous layer are solved for the following cases:

(i) The layer is lying on a homogeneous medium.

(ii) The layer is imbedded between two half-spaces.

(iii) The layer is welded contact with another layer of different nature.

The frequency equations in all these cases are obtained and the phase velocities are determined numerically.

The third chapter comprises of a problem on the propagation of SH-wave through a layer which is a heterogeneous Voigt solid and lying on a Voigt medium. In this case the frequency equation is deduced and its nature is discussed.

In the last chapter we have discussed the transmission of transverse waves through different types of layers:

(i) Voigt solid layer,

(ii) Maxwell solid layer,

(iii) Second-order fluid layer,

(iv) Homogeneous elastic layer under the action of a magnetic field.

In each case the layer is taken to be sandwiched between homogeneous elastic media. The expressions for the transmission ratio and for the change in the phase are obtained. The effects of solid viscosity, relaxation time, visco-elasticity of fluid and magnetic intensity on the transmission ratio are examined. The numerical results for all the above cases are given.