

INSTRUCTION MANUAL

LATTICE DYNAMIC KIT WITH FREQUENCY METER



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LATTICE DYNAMICS KIT

I. INTRODUCTION :

Lattice dynamics is an essential component of any postgraduate course in physics and material science. In particular it is essential for understanding the interaction of electro-magnetic waves and crystalline solids. In general, students find it difficult to understand involved concepts like ACOUSTICAL MODE, OPTICAL MODE, ENERGY GAP etc., which they cannot see for themselves in the laboratory. Such a difficulty can be overcome by introducing a laboratory exercise in which the student follows a carefully prescribed procedure which presents him with a simplified model of the system and allows him to verify well established theories. In the process he gains an insight into the concepts. The lattice dynamics kit provides such an experience in the study of dynamics of mono and di-atomic lattices.

The following experiments may be performed with the help of the kit.

- (i) Study of the dispersion relation for the mono-atomic lattice-Comparison with theory.
- (ii) Determination of the cut-off frequency of the mono-atomic lattice.
- (iii) Study of the dispersion relation for the di-atomic lattice – ‘acoustical mode’ and ‘optical mode’ energy gap. Comparison with theory.

II DETAILS OF KIT

The lattice dynamics kit has built-in audio oscillator that works on 220 V, 50 Hz and the only additional equipment needed is a general purpose C.R.O having XY mode. The Kit consists of the following parts:

- (i) Audio oscillator with amplitude control and facility to vary the frequency in the following ranges:

Switch position	Frequency range	Output Voltage
LO	0.8 – 8.9 KHz	4 – 6 V
HI	8.7 – 91 KHz	4 – 6 V

