CENTRE FOR DEVELOPMENT OF PHYSICS EDUCATION

Department of Physics, University of Rajasthan,
JAIPUR 302004(INDIA)

About fabrication and supply activity of CDPE

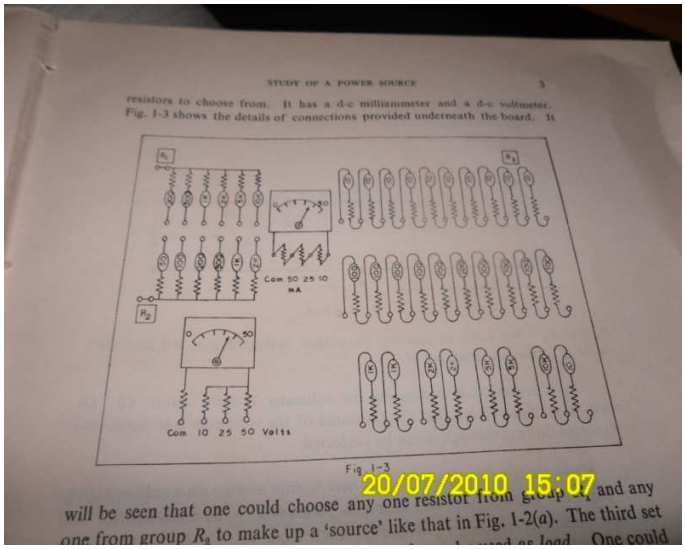
The Centre for Development of Physics Education (CDPE) at the University of Rajasthan was established by the University Grant Commission, Government of India in 1978. As a part of its main activities, the CDPE has developed several instructive equipments for student's laboratory to render the study of physical phenomena and concepts more interesting and elaborate. On specific request, the CDPE can take up fabrication of these equipments for the academic institutions. The prices are charged on **a "NO PROFIT NO LOSS BASIS"** in accordance with the guidelines laid down by the UGC committee.

The CDPE suggests that a person of academic staff may be deputed by the institution to take delivery of the equipment requested. This will provide an opportunity to know the full potential and use of the desired equipment and also a familiarity with other equipments developed here. Since the primary aim of Centre is the development activity, fabrication of equipment is done by the center only as a part of service to academic institution. **Hence, the institutions are requested to give sufficient advance intimation along with 100% cost of equipment* at the time of order.** The supply may take about 3 to 4 months depending upon the quantity after the receipt of the advance money. The CDPE will very much appreciate if any specific observations or comments about the equipment are brought to our notice for correction or further improvements. Payment is to be made through demand draft only drawn in favour of **"DIRECTOR, CDPE ,UOR, Jaipur".**Cheque will not be acceptable. *If the equipment is to be delivered at your place then, 10% of the cost will be charged as packing, forwarding and transportation charges.

Date: 01.04.2019

Dr.R KSinghal
DIRECTOR

List of the Equipment
&
Price List

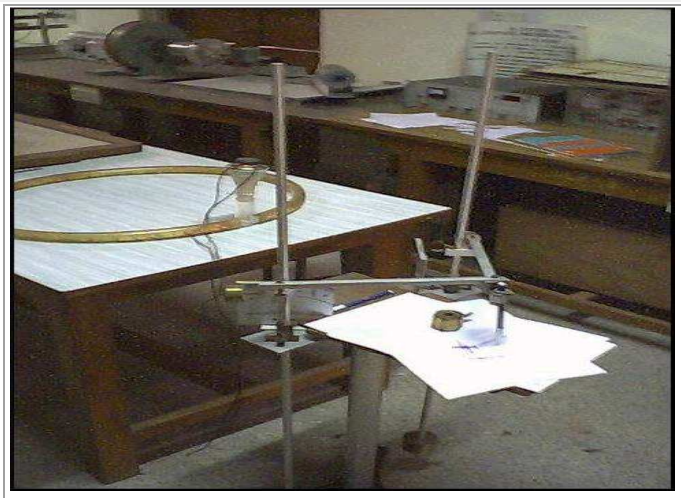
	CATEGORY-A	COST (in Rs.)
A-1	 **Network Board 1** 1 (a) For the study of Power source 1 (b) Electronically regulated powersupply 0-30 Volt 500 mA max	6710/- 8470/-
A-2	**Network Board 2** 2(a) For the study of charging and discharging of a capacitor 2(b) Electronically regulated power supply 0-30 Volt, 500mA max, 2(c) Metronome(Non -digital audio signal)	6270/- 8470/- 2090/-
A-3	 **Network Board 3** 3 (a) For the study of RC circuit with varying EMF 3(b) Electronically regulated power supply 0-30 Volt 500 mA	5830/- 8470/-

A-4	 **Network Board 4** 4 (a) For study of RC Circuit with an ultra low frequency source 4(b) Ultra Low frequency Oscillator. It provides 11 different frequencies in range 0.1 Hz to10 Hzmax.	8580/- 8360/-
A-5	 **Network Board 5** (For study of RC circuit with AC mains)	7370/-
A-6	 **Network Board 6** 6(a) For study of LCR circuit 6(b)Audio freq oscillator withpower amplifieroutput 10W at 10ohm	7150/- 10890/-

A-7	 **Network Board 7** (For study of Phase measurement by superposition)	7700/-
A-8	 **Network Board 8** (For study of RC Transmission Line)	6050/-
A-9	**Network Board 9** (For study of LC Transmission Line)	15840/-

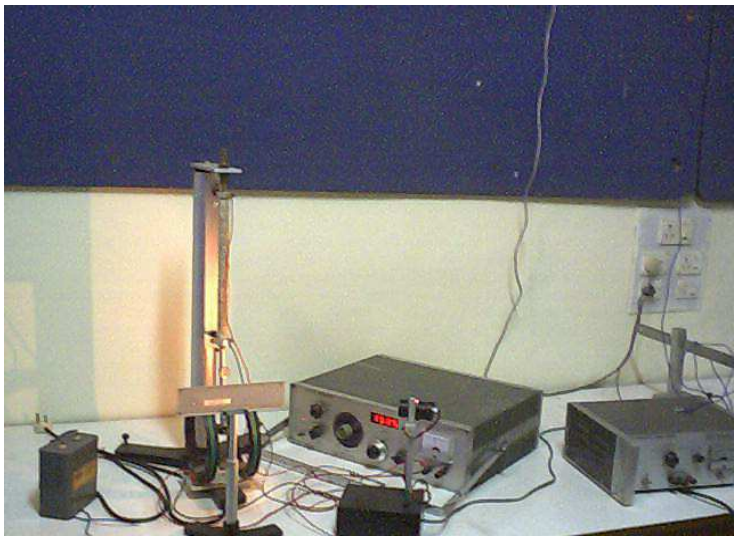
A-10	 **Apparatus for study of Electromagnetic Induction** (a) Mechanical Part . (b) Measurement Board	 8470/- 6050/
	CATEGORY-B	
B-1		
	Linear Air Track(perspex) with accessories consisting of : Track with its base, Riders(8+4), Spacers(Set of 10) Stand for oscillating magnets-One Clamp for side magnets(Magnets five pair)	Rs.28710/-
	1(a) **Digital Timer** - Two Channel (with 4 photo sensors)provides measurement of pulse duration, phase period, and two separate pulses with an accuracy of 10 micro Sec on each channel. Two four digit displays are used.	Rs. 27940/-
	1(b) **Spare Photo sensors-per piece** Note: Air blower Wolf 370 Watt required for the running of air-track can be purchased from the local market and is not supplied.	Rs 1320/-

B-2	 (a) **Driven Oscillator System** (b) **Digital Timer**-Two channel (with four sensors)	16610/- 27940/-
B-3	 **Coupled Oscillator systems**	10120/-
B-4	 **Mechanical Transmission Line (Double Line)**	28490/-

B-5	 **Lissajous figure apparatus** (Démonstrationapparatus)	8910/-
B-6	 **Compound Pendulum** (For studying electromagnetic damping) The above experiments and equipments are described in books "Physics Through Experiments I : EMF Constant and Varying" and "Physics Through Experiments-II: Mechanical Systems", by Prof. B.L.Saraf et al. and published by Vikash publication.	6490/-
	CATEGORY - C : ADVANCED LEVEL EXPERIMENTS	
	The following advanced level experiments are for students studying in B.Sc., M. Sc., M.Phil or Pre Ph.D. courses. Typical experimental data on these experiments is given in the Academic Report of All India Advanced level Summer Institute in Experimental Physics conducted by CDPE in Summer 1977, a CDPE publication.	

C-1	 **Geiger Counting System(<u>Without</u>** halogen quenched G.M.Tube) The system consists of a regulated high voltage power supply (300-750 volt, 1mA current)	27060/-
C-2	 **Scintillation Spectrometer**(Without Integral Line assembly) The system consists of dynode chain and pre-amplifier signal Channel Analyzer. The high voltage supply has a variable range from 500 Volt to 1500 Volt, the variation being done by ten turn potentiometer. Regulation is better than 0.1 % at 1mA load current	36190/-
C-3	 **Beta - ray Spectrometer** (a) Beta Spectrometer housing and lens coil The thin lens beta ray spectrometer housing is 10 cm dia X 100 cm long glass pipe. The central obstacle is made of aluminum pipe filled with lead. Two angular momentum selecting turns of 14 SWG copper wire wound on aluminum former. Analyzed electron beam is detected	55440/-

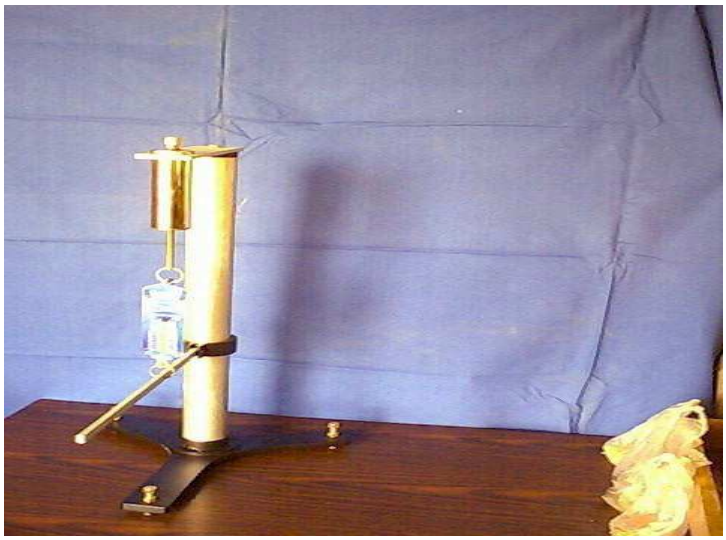
	externally. The best resolution attained is 2 %.	
	(b) **Current Regulated Power supply** 0-60 Volts 6 Ampere	32230/-
	(c) **GM Counting System** (Without G.M.Tube) (See C-1 for detail)	27060/-
	Note : A rotary vacuum pump(**not supplied by us**) is essential for generation of vacuum in the spectrometer tube.	
C-4	 **Compton scattering set up**	
	(a) Angular Variation table, source collimator, detector shields and Al, Pb, Cu and perspex scatters	21450/-
	(b) Scintillation Spectrometer (Without integral line assembly, see C-2 for details)	36190/-
C-5	 **External Bremstralung study set-up**	
	(a) Experimental setup(geometrical arrangement and targets for Bremstralung studies)	6490/-
	(b) Scintillation Spectrometer (without integral line assembly, see C-2 for details)	36190/-

C-6	 **Spark chamber** for alpha particles* counting & range determination comprising of Spark counter 5 Kv HV Supply and electronic counter *Alpha Source to be procured separately by user from Board of Radio isotope (BRIT), BARC, Trombay, Mumbai –400085	28490/-
C-7	 **Apparatus for measurement of rigidity and internal friction of solids in the form of rods.**	34430/-
	The System consists of a mechanical assembly consisting of the specimen rod, along with a clamp for a bar magnet. In addition there is a Helmholtz coils system for feeding oscillators output to the coils. The oscillator provides the sine, square and triangular wave output in the range of 10 Hz to 10 KHz. The Oscillators frequency can be set anywhere between the above limits and fine variation in frequency can be made by a ten turn helipot. The frequency resolution is 0.02 percent. A/4-digit timer is in cooperated to measure the period directly. Arrangement to heat the specimen and a lamp-scale assembly are also provided.	
	(a) Mechanical Part	Rs.9350/-
	(b) Function Generator	Rs. 25080/-
	Note - The details of the experiment are in article “Temperature variation of modulus of rigidity and internal friction with torsion oscillator” American Journal of Phys, 53(12) Dec.1985, p1192-95	

C-8	 **Normal Modes and Dispersion relation in a beaded string**	
	(a) Mechanical	Rs.5940/-
	(b) Function Generator	Rs. 25080/-
	Note- The Details of this experiment are in the article " Normal modes and dispersion relation in beaded string-An experimental for an undergraduate laboratory" American Journal of Physics, 53(5),May1985, pp 479-481	
C-9	 **Two strip mechanical system for the study of normal modes of coupled oscillator system**	Rs. 8470/-

C-10	 **Fourier Analysis kit**	Rs.26400/-
	Comprising of precession capacitor bank, Air core copper inductor (0.1 H), Signal Generator	

	CATEGORY-D: MISCELLANEOUS EXPERIMENT	
D-1	Statistical Board and kit Board-1, four faced dice-5 and 1500 Cubes-400	Rs. 5170/-
D-2	(i) Apparatus for study of fall of magnet through a metal cylinder, consisting of: Aluminum Cylinder (3 pcs) Release System (coil)- One Counter Weights with hanger, (A digital double timer which is not supplied is essential for quantitative measurement, the rate is quoted below)	Rs. 10670/-
	(ii) Digital Timer with four photo sensors	Rs. 27940/-
D-3	 Angular Momentum Apparatus (conservation of angular momentum demonstration apparatus)	Rs. 3520/-

D-4	 (a) An experiment with spring to study reversibility as a step process	Rs.6380/-
	(b) Digital Timer -Two Channel(With four photo sensor)	Rs. 27940/-
	Note - The details of this experiment are given in the article "Reversibility and step processes: An experiment for under graduate laboratory" American Journal of Phys, 52(10) Oct, 1984, p 945-947.	
D-5	 Parametric amplifier	
	(i.) Mechanical	Rs. 10010/-
	(ii) Digital Timer with four sensors	Rs. 27940/-

D-6	 **Barton's Pendulum** A system of 50 simple pendulums of 75 cm length are mounted on a bar. This arrangement is driven through a bar pendulum, which is a maintained oscillator. The frequency of each pendulum is varied and resonance response is viewed by adjusting the length gradient of the set of pendulums.	Rs.18260/-
D-7	**Two Length pendulum apparatus**	Rs.5500/-
	It is a demonstration apparatus in which in half the swing of a simple pendulum its length can be adjusted to any desired value. The principal of energy conservation for a pendulum having different lengths in half swing is demonstrated with the help of this apparatus by measuring amplitude.	
D-8	**Vector Addition (Force)Table**	Rs.5720/-
	This is an apparatus in the form of a circular table in horizontal plane on which weights can be suspended through pulleys(four) to demonstrate addition of forces.	
D-9	 A modern Version of Otto - Von Guericke Hemishpheres: Atmospheric addition pressure and vacuum.	Rs.4620/-
D-10	**(a) AMPERE BALANCE** In this apparatus the force acting between parallel currents in rectangular coils can be balanced by weighing.	Rs.5170/-
	(b) Power supply(2 Ampere ,12 Volt)	Rs.8470/-

D-11	**Magnetic balance** In this apparatus the magnetic force between to poles is balance by the force gravity (Weight).By varying the distance between the two poles the inverse square law of force may be verified.	Rs.4840/-
D-12	 Anharmonic Oscillator	Rs.6490/-
D-13	Plasma Chamber	Rs.88000/-
D-14	Table Top Focult Pendulum	Rs.27500/-
D-15	Rutherford Scattering	Rs.23870/-
D-16	Model of Solid	Rs.1100/-
D-17	Laser Diffraction Kit	Rs.12870/-
D-18	Microwave Diffraction set up Complete with Klystron Source Power Supply, Two horns Diffraction Table and a Cubic Lattice with Thermocole and Al-pellets	Rs. 82500/-

Note -

i. Adequate number of connecting cords are provided with each experimental set up wherever necessary.
ii. Packing and Forwarding charges at the rate of 10 % of the cost of equipment are to be paid separately.
iii. Institution acquiring CDPE equipment may be required to pay sales tax if levied by the Government as and when it is levied.

Date: 01.04.2019

DIRECTOR