



INTEGRAL UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
TRANSPORTATION ENGINEERING LAB

The Transportation Engineering laboratory in the Department of Civil Engineering is well equipped with all the required instruments and equipment that are helpful in the overall understanding and practical knowledge of a student. Transportation Engineering Lab consists of equipment used in the testing of bituminous material such as Softening Point, Ductility, Penetration etc. and for aggregate such as Impact Value, Los Angeles Abrasion Value, Crushing Value etc. California Bearing Ratio Testing Equipment which is used for soil strength analysis and Marshall Stability Testing Machine used for bitumen mix design are also available in the laboratory.

S.NO.	APPARATUS NAME	IMAGE	DESCRIPTION
1.	C.B.R. Testing Machine		<p>California Bearing Ratio (CBR) Testing Machine is used to measure of the strength of subgrade soil, highway sub base and subgrade via a penetration test. It sounds complicated but the basis behind it is quite simple. The resistance of the subgrade i.e the layer of naturally occurring material upon which the road is built to deformation under the load from vehicle wheels is determined.</p>

<p>2.</p>	<p>Impact Testing Machine</p>	 <p>The image shows an impact testing machine, which is a mechanical device used to determine the impact resistance of materials. It consists of a vertical frame with a pendulum arm at the top, a cylindrical weight, and a base where the sample is placed. The machine is mounted on a yellow base. A label at the bottom of the base reads "IMPACT TESTING MACHINE".</p>	<p>Impact Testing Machine is used for determination of impact value of aggregate. Aggregate Impact Value is the ability of aggregates that resist sudden impact or shock load on it. Also, it can be defined as the resistance of aggregate to failure by impact load is known as the Impact Value of Aggregate.</p>
<p>3.</p>	<p>Los Angeles Abrasion Machine</p>	 <p>The image shows a Los Angeles Abrasion Machine, which is used to measure the degradation of mineral aggregate. It features a large rotating steel drum with a motor on the side. The machine is mounted on a yellow base. A label at the bottom of the base reads "LOS ANGELES MACHINE".</p>	<p>Los Angeles Abrasion Machine is used to measure the degradation of the mineral aggregate of standard grading resulting from a combination of actions including abrasion or attrition, impact and grinding in a rotating steel drum containing a specified number of steel spheres. The Los Angeles Abrasion test is a common test method used to indicate aggregate toughness and abrasion characteristics</p>

4.

Thickness Gauge



Thickness Gauge is measured particle shape of aggregates (Flakiness Index) used in pavement base course or asphalt and concrete mixes. The Thickness is made from heavy-gauge stainless steel with precision laser-cut openings and etched size markings for each slot. The Thickness Gauge meets BS-812 specifications and features seven slots for rapid hand trying of particles from each of the seven sieve fractions from 2.5 to 0.25in (63 to 6.3mm).

5.

Length Gauge



Length Gauge measures the elongation index of aggregates for classification. The model has six stainless steel pins set in a brushed aluminum base. Six labelled openings between pairs of pins are used in determining the length of particles from each of the sieve fractions tested under 50 mm.

6.

Sieve Set



A sieve analysis or gradation test determines the distribution of aggregate particles by size within a given sample. Coarse aggregate means the aggregate which is retained on a 4.75mm sieve when it is sieved through 4.75mm. To find fineness modulus of coarse aggregate we need sieve sizes of 80mm, 40mm, 20mm, 10mm, 4.75mm, 2.36mm, 1.18mm, 0.6mm, 0.3mm and 0.15mm

<p>7.</p>	<p>Ductility Testing Machine</p>		<p>Ductility Testing Machine is used for determining the ductility of bituminous materials by measuring the elongation before breaking when two ends of briquette specimens are pulled apart at a specified speed and temperature. The machine consists of a carriage moving over a lead screw. An electric motor driven reduction gear unit ensures smooth constant speed and continuous operation. The entire assembly is mounted with a water bath completely encased in metal-bound hardwood. It is equipped with an electric pump circulator and heater. The temperature is controlled by a digital temperature controller.</p>
<p>8.</p>	<p>Bitumen Extractor Apparatus</p>		<p>Bitumen Extractor is used for determination and checking of bitumen percentage in the bituminous mix, the mix is added with a solvent and dissolved bitumen is removed by centrifugal action. It is Consists of a removable aluminium rotor bowl with, a capacity of 1500 gm with a cap and tightening nut. The bowl assembly is mounted on a vertical shaft that protrudes from a cast housing. This shaft and thus the bowl is rotated fast manually by enclosed gears in the cast body and handle.</p>

9.

Bitumen Penetration Apparatus



Bitumen Penetration Apparatus is used for testing bitumen. A Chosen force is applied over a given area for a known period and the depth of penetration or the depression made in the sample is measured in tenths of a millimeter which is expressed as a penetration number.

A penetrometer consisting of a needle assembly with a total weight of 100 gm and a device for releasing and locking needles in any position.

10.

Ring And Ball Apparatus



Ring And Ball Apparatus is used for determination of softening point of bituminous materials according to IS: 1205-1958, softening point is that temperature at which the specimen under test becomes soft enough to allow a steel ball of specific dimension to fall a required distance under test condition. The apparatus consists of a glass beaker, ring stand, two steel balls with ring and ball guide.

11.

Viscometer Apparatus



Viscometer Apparatus is used for determining the viscosity of cut back bitumen and road oil. The viscometer consists of a chrome plated copper bath, with a drain valve and a central tube to receive the test cup and to position the stirrer, and is mounted on a stand with leveling feet. Stirrer has a curved shield and is provided with an insulated handle, thermometer socket and swivel support for the valve.

12.

**Cleveland Open Cup Apparatus
(Flash and Fire Point)**



Cleveland Open Cup Apparatus is used for determination of Flash & Fire Point of the bitumen. Flash & Fire Point test of Bitumen is used to determine the safe temperature up to which bitumen sample can be exposed. This test of bitumen sample is one of the important tests of bitumen to be conducted before road construction.

13.

Marshall Stability Testing Machine and Marshall Compactor



Marshall Stability Testing Machine used for the measurement of the resistance to plastic flow of cylindrical specimens of bituminous paving mixture loaded on the lateral surface. For use with a hot mixture containing asphalt or tar and aggregate up to 25.4 mm maximum size. This test procedure is used in designing and evaluating bituminous paving mixes.

Marshall Compactor is designed to provide a stable and rigid mechanism to be used for the preparation of bituminous specimens for Marshall Stability tests.

14.

Hot Air Oven



Hot Air Oven are electrical devices that use dry heat to sterilize. They were originally developed by Pasteur. Generally, they can be operated from 0 to 300 °C using a thermostat to control the temperature. Their double-walled insulation keeps the heat in and conserves energy, the inner layer being a poor conductor and the outer layer being metallic. There is also an air-filled space in between to aid insulation. An air circulating fan helps in the uniform distribution of the heat.