AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

17CVCC82 - Strength of Materials Lab

Standard Operating Procedures (SOP)

Name of the Lab /facility	**Strength Of the Materials Lab**
Purpose	**To study the UTM and perform the tensile test.**
Scope	**The concept of UTM test can be studied easily and to find Tensile, shear, Double shear properties of given specimens and also easy to operate and ideal for group studies & demonstration.**
UNIVERSAL TESTING MACHINE (UTM)	

PROCEDURE:

1. **The load pointer is set at zero by adjusting the initial setting knob.**
2. **The dial gauge is fixed and the specimen for measuring elongation of Small amounts.**
3. **Measuring the diameter of the test piece by vernier caliper at least at three places and determine the mean value also mark the gauge length.**
4. **Now the specimen is gripped between upper and middle cross head Jaws of the m/c.**
5. **Set the automatic graph recording system**
6. **Start the m/c and take the reading.**
7. **The specimen is loaded gradually and the elongation is noted until the Specimen breaks.**

Name of the Lab /facility	Strength Of the Materials Lab
Purpose	To determine the stiffness of spring, modulus of rigidity of the spring wire and maximum strain energy stored.
Scope	The concept of Impact test can be studied easily and to find impact energy of given specimens and also easy to operate and demonstration.

IMPACT TEST - IZOD

PROCEDURE:

1. Raise the swinging pendulum weight and lock it.
2. Release the trigger and allow the pendulum to swing.
3. This actuates the pointer to move in the dial.
4. Note down the frictional energy absorbed by the bearings.
5. Raise the pendulum weight again and lock it in position.
6. Place the specimen in between the simple anvil support keeping the ”U” notch in the direction opposite to the striking edge of hammer arrangement.
7. Release the trigger and allow the pendulum to strike the specimen at its midpoint.
8. Note down the energy spent in breaking (or) bending the specimen.
9. Tabulate the observation.

Name of the Lab /facility	**Strength Of The Materials Lab**
Purpose	**To conduct the torsion test on the given specimen forthe following** **1. Modulus of rigidity** **2. Shear stress**
Scope	**The concept of Torsional test can be studied easily and to find torsion properties of given specimens and also easy to operate & demonstration.**
Responsibility	**Faculty Incharge, HOD/MECH**

TORSION TEST

PROCEDURE:

1. **Measure the diameter and length of the given rod.**
2. **The rod is fixing in to the grip of machine.**
3. **Set the pointer on the torque measuring scale.**
4. **The handle of machine is rotate in one direction.**
5. **The torque and angle of test are noted for five degree.**
6. **Now the handle is rotated in reverse direction and rod is taken out**

FORMULA USED:

1. Modulus of rigidity, $C = \frac{TL}{J\alpha}$ N/mm^2

Where,

α =angle of degree

2. Shear stress (t) =TR/L N/mm^2

Name of the Lab /facility	**Strength Of The Materials Lab**
Purpose	**To determine the Young"s modulus of the given specimen by conducting bending test.**
Scope	**The concept of Beam deflection test can be studied easily and to find young's modulus properties of given specimens and also easy to operate & demonstration.**
Responsibility	**Faculty Incharge, HOD/MECH**

BEAM DEFLECTION TEST

PROCEDURE:

1. **Measure the length (L) of the given specimen.**
2. **Mark the centre of the specimen using pencil / chalk**
3. **Mark two points A & B at a distance of 350mm on either side of the centre mark. The distance between A & B is known as span of the specimen (l)**
4. **Fix the attachment for the bending test in the machine properly.**
5. **Place the specimen over the two supports of the bending table attachment such that the points A &B coincide with centre of the supports. While placing, ensure that the Tangential surface nearer to heart will be the top surface and receives the load.**
6. **Measure the breadth (b) and depth (d) of the specimen using scale.**
7. **Place the dial gauge under this specimen at the centre and adjust the dial gauge Reading to zero position.**
8. **Place the load cell at top of the specimen at the centre and adjust the load indicator in the digital box to zero position.**
9. **Select a strain rate of 2.5mm / minute using the gear box in the machine.**
10. **Apply the load continuously at a constant rate of 2.5mm/minute and note down the deflection for every increase of 0.25 tonne load up to a maximum of 6 sets of readings.**
11. **Calculate the Young"s modulus of the given specimen for each load using the following formula:**

$$\text{Young's modulus, } E = \frac{Pl^3}{48I\delta}$$

Where,

P = Load in N

L = Span of the specimen in mm

I = Moment of Inertia in mm^4 ($bd^3/12$)

b = Breadth of the beam in mm.

d = Depth of the beam in mm

δ = Actual deflection in mm.

12. **Find the average value of young"s modulus that will be the Young"s modulus of the given specimen.**

Name of the Lab /facility	**Strength Of The Materials Lab**
Purpose	**To determine the stiffness of spring, modulus of rigidity of the spring wire and maximum strain energy stored.**
Scope	**The concept of spring test can be studied easily and to find stiffness properties of given springs and also easy to operate and ideal for group studies & demonstration.**
Responsibility	**Faculty Incharge, HOD/MECH**

SPRING TEST

PROCEDURE:

1. **By using Vernier caliper measure the diameter of the wire of the spring and also the diameter of spring coil.**
2. **Count the number of turns.**
3. **Insert the spring in the spring testing machine and load the spring by a suitable weight and note the corresponding axial deflection in compression.**
4. **Increase the load and take the corresponding axial deflection readings.**
5. **Plot a curve between load and deflection. The shape of the curve gives the stiffness of the spring.**