NATIONAL INSTITUTE OF TECHNOLOGY, DURGAPUR-713209
DEPARTMENT OF MECHANICAL ENGINEERING
SOLID MECHANICS SESSIONAL (MES451)
INSTRUCTION SHEET FOR SOLID MECHANICS LABORATORY
NOTCH IMPACT TESTING

Title:

Object: To determine and compare the notch impact strength of the following material
a) Cast steel in as-caste condition
b) Same still in cast and annealed condition
c) Heat-treated steel
d) Grey cast iron
e) Brass

Apparatus: Pendulum impact testing machine in which the notched test piece is placed horizontally in a bearing in such a way that the pendulum strikes the test specimen at a point opposite to the centre of the notch.

Theory: When a pendulum of mass "m" is lifted up about its point of suspension so that the centre of gravity is raised to a height H from its initial position of rest, the potential energy stored by the pendulum is (mgH). If now, from this position, the pendulum is allowed to fall under gravity and strike a notched specimen placed at the lowest initial position of the pendulum, a part of the energy of the pendulum will be expended in deforming and breaking the test specimen at the notch, and the pendulum continuing its flight, will swing to a height "h" where h<H. Assuming that there has been no loss of energy due to friction etc, the energy absorbed by the test specimen is equal to mg(H-h). A pointer guided by the pendulum road indicates directly this energy absorbed in kg-metre, which is a measure of the notch impact strength of the test specimen at the temperature of test.

Procedure: 1) Fasten the required hammer (30 or 15 kg) to the pendulum road.
2) Screw the bearings necessary for the test piece on the bed plate.
3) Lift the pendulum by hand to its highest position and lock it.
4) Place the sample on the bearing so that the notch is turned away from the knife-edge of the hammer. Align properly the sample with the alignment rod provided for the purpose.
5) Adjust the pointer to maximum reading of the scale.
6) Shift the lever for the pendulum brake to the "stop" position on the right side.
7) After being sure that nobody is in the range of the pendulum when released and that nobody is very close to the test piece, release the pendulum by- i) drawing out the "bolt" locking it and ii) simultaneously pressing lever. Both in hands should be used for doing the above.

8) Slowly apply brake to the oscillating pendulum.

9) Read and note down the reading against the pointer.

Precautions:
1) For obtaining comparable results the machining of the test piece and particularly the notch, should be strictly according to the specifications.

2) The test piece should be correctly aligned by the alignment rod supplied so that the knife edge of the pendulum strikes the test piece exactly opposite to the centre of the notch.

3) Keep away from the path of the pendulum when the lever is being pressed.

4) Before the pendulum is released, the pendulum brakes must be brought to the "stop" position

Report with the following:

1) A sketch of the impact testing machine.

2) Theory, procedure, precautions, results with the temperature of test.

3) A sketch of the test piece with dimensions and permissible machining tolerances.

4) **Answer the following**

a) What information does a notch impact test give about the material of the test piece?

b) How are the fractures of the test specimens: granular, fibrous or a mixture of the two?

c) How are the fractures different from those obtained in similar materials from a static tensile test at room temperature?

Observation chart and result sheet:

Error material	Reading on energy absorbed (kgf. m)	Corrected Energy absorbed (kgf. m)