EXPERIMENT No. 1

TENSION TEST

AIM: Determine tensile Strength of a given specimen using UTM.

OBJECT: To conduct a tensile test on a mild steel specimen and determine the following:

(i) Limit of proportionality

(ii) (ii) Elastic limit

(iii) (iii) Yield strength

(iv) (iv) Ultimate strength

(v) (v) Young's modulus of elasticity

(vi) (vi) Percentage elongation

(vii) (vii) Percentage reduction in area.

APPARATUS:

(i) Universal Testing Machine (UTM)

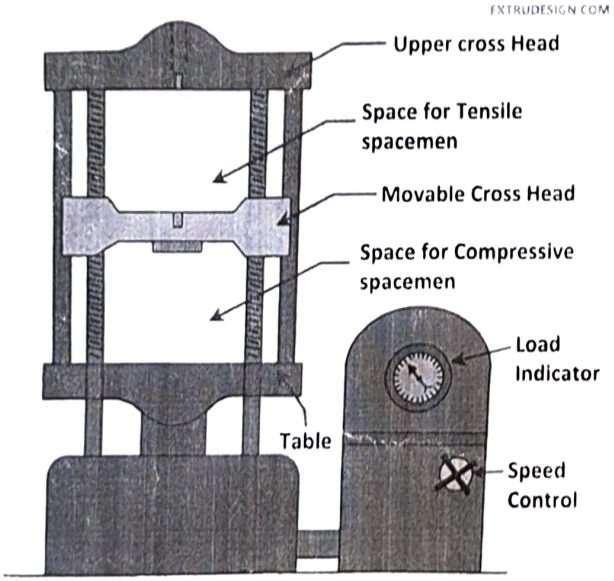
(ii) (ii) Mild steel specimens

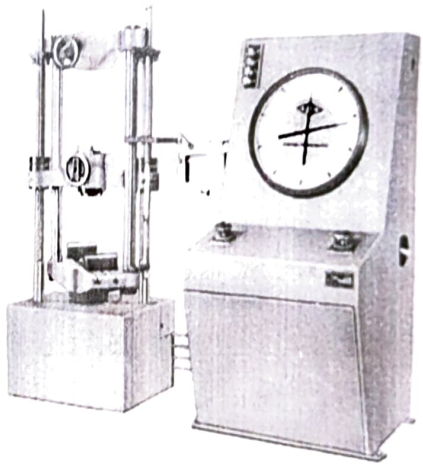
(iii) (iii) Graph paper

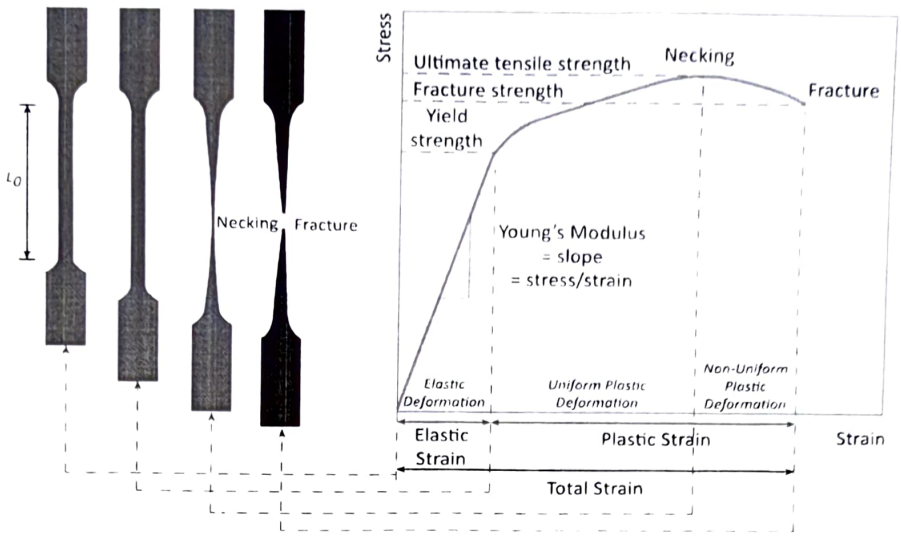
(iv) (iv) Scale

(v) (v) Vernier Caliper

DIAGRAM:







THEORY:

The tensile test is most applied one, of all Civil tests. In this test ends of test piece are fixed into grips connected to a straining device and to a load measuring device. If the applied load is small enough, the deformation of any solid body is entirely elastic. An elastically deformed solid will return to its original form as soon as load is removed. However, if the load is too large, the material can be deformed permanently. The initial part of the tension curve which is recoverable immediately after unloading is termed. As elastic and the rest of the curve which represents the manner in which solid undergoes plastic deformation is termed plastic. The stress below which the deformations essentially entirely elastic is known as the yield strength of material. In some material the onset of plastic deformation is denoted by a sudden drop in load indicating both an upper and a lower yield point. However, some materials do not exhibit a sharp yield point. During plastic deformation, at larger extensions strain hardening cannot compensate for the decrease in section and thus the load passes through a maximum and then begins to decrease. This stage the "ultimate strength"' which is defined as the ratio of the load on the specimen to original cross-sectional area, reaches a maximum value. Further loading will eventually cause 'neck' formation and rupture.

About of UTM

The tensile test is conducted on UTM. It is hydraulically operates a pump, oil in oil sump, load dial indicator and central buttons. The left has upper, middle and lower cross heads i.e; specimen grips (or jaws). Idle cross head can be moved up and down for adjustment. The pipes connecting the lift and right parts are oil pipes through which the pumped oil under pressure flows on left parts to more the cross-heads.

SPECIFICATIONS:

1. Load capacity = 0-40 Tones.
2. Least count = 8 kgf.
3. Overall dimension. =
4. Power supply = 440 V

PROCEDURE:

1. Measure the original length and diameter of the specimen. The length may either be length of gauge section which is marked on the specimen with a preset punch or the total length of the specimen
2. Insert the specimen into grips of the test machine and attach strain-measuring device to it
3. Begin the load application and record load versus elongation data.
4. Take readings more frequently as yield point is approached.
5. Measure elongation values with the help of dividers and a ruler.
6. Continue the test till Fracture occurs.
7. By joining the two broken halves of the specimen together, measure the final length and diameter of specimen.

OBSEVATION:

(a) Initial diameter of specimen d1 =

(b) Initial gauge length of specimen L1 =

(c) Initial cross-section area of specimen A1 =

(d) Load of yield point F_1 =

(e) Ultimate load after specimen breaking F =

(f) Final length after specimen breaking L_2 =

(g) Diameter of specimen at breaking place d2 =

(h) Cross section area at breaking place A2

PRECAUTIONS:

1. The specimen should be prepared in proper dimensions.
2. The specimen should be properly to get between the jaws.
3. Take reading carefully.After breaking specimen stop to m/c.

RESULT:

(i) Average Breaking Stress =

(ii) Ultimate Stress =

(iii) Average % Elongation =

VIVA-QUESTIONS

1. Which steel have you tested? What is its carbon content?
2. What general information is obtained from tensile test regarding the properties of a material?
3. Which stress have you calculated: nominal stress or true stress?
4. What kind of fracture has occurred in the tensile specimen and why?
5. Which is the most ductile metal? How much is its elongation

APPLICATIONS:

1. In Aerospace
2. Automotive
3. Packaging
4. sports

- Wide range of uses for tensile testing:

Aerospace: Turbine blades 

Automotive: Seatbelts/Bumpers/Mudflaps 

Packaging: Ring pulls/tight packaging 

Sport: Racquet strings 

OBESERVATION TABLE:

S.No	Load (N)	Original Gauge Length	Extension (mm)	Stress (N/mm2)	Strain