# **Materials**

## 1 Bulk Properties of solids

Hooke's law - Force is directly proportional to extension, provided the proportionality limit has not been reached

#### 1.1 Spring constant

#### 1.1.1 Series

$$Spring\; constant = \frac{Spring\; constant\; of\; one\; spring}{Number\; of\; springs}$$

#### 1.1.2 Parallel

Spring constant=Spring constant of one spring  $\times$  Number of springs

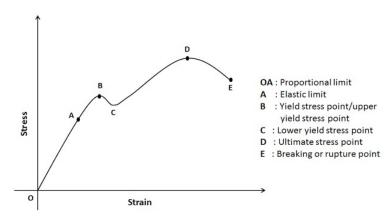
#### 1.2 Material properties

Brittle material - Snap

Ductile material - Stretch

Plastic Behaviour - The behaviour of a material after it has reached it's elastic limit

#### 1.3 Stress strain graph of a metal wire



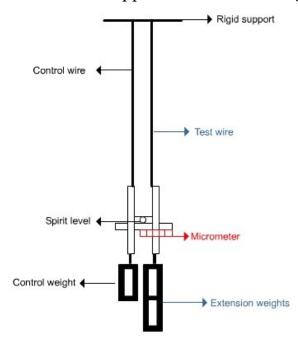
## 2 The Young Modulus

The gradientof a stress strain graph is the Young Modulus

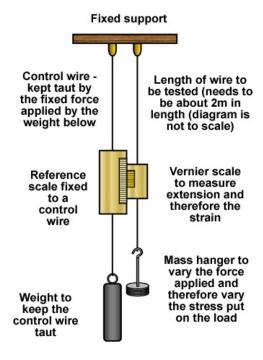
**Units** of Young Modulus: Nm<sup>-2</sup> or Pa

Stiff Material - High Young Modulus Flexible Material - Low Young Modulus

## 2.1 Searle's apparatus for measuring Young's Modulus

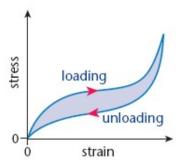


## 2.2 Vernier apparatus for measuring Young's Modulus

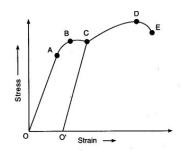


# 3 Stress Strain Graphs

# 3.1 Rubber



# 3.2 Metal



## 3.3 Polythene

