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AN AUTONOMOUS INSTITUTION

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UNIT – I PROPERTIES OF MATTER

TOPIC – III : Factors affecting Elastic Modulus

Some bodies lose their elastic property even within the elastic limit, due to elastic fatigue. Apart from elastic fatigue some materials will have change in their elastic property because of the following factors:

- i. Effect of stress
- ii. Effect of annealing
- iii. Change in Temperature
- iv. Presence of impurities
- v. Due to the nature of cycles

(i) Effect of Stress

When a material is subjected to large number of cycles of stresses, it loses its elastic property even within the elastic limit. Therefore, the working stress on the material should be kept lower than the ultimate tensile strengthening and the safety factor.

(ii) Effect of Annealing

Annealing is a process by which the material is heated to a very high temperature and then it is slowly cooled. Usually this process is adopted for the materials to increase the softness and ductility in the materials. But if annealing is made to a material it results in the formation of large crystal grains, which ultimately reduces the elastic property of the material.

(iii) Effect of Temperature

The elastic property of the materials changes with the temperature. Normally the elasticity increases with the decrease in temperature and vice-versa.

Examples:

- a. The elastic property of Lead increases when the temperature is decreased.
- b. The carbon filament becomes plastic at higher temperature.

(iv) Effect of impurities

The addition of impurities produces variation in the elastic property of the materials. The increase and decrease of elasticity depends on the type of impurity added to it.

Examples:

- a. When potassium is added to gold, the elastic property of gold increases.
- b. When carbon is added to molten iron, the elastic property of iron decreases, provided the carbon content should be more than 1% in iron.

(v) Effect of nature of Crystals

The elasticity also depends on the types of the crystals, whether it is a single crystal or poly crystal. For a single crystal the elasticity is more and for a poly-crystal the elasticity is less.