- **Stress – strain curve for concrete :**

Fore ways of defining the modulus of elasticity

- The slop of a line that is tangent to point on Stress – strain curve call ***Tangent modulus of elasticity .***
- The slop of the Stress – strain curve at the origin is the call ***initial Tangent modulus of elasticity.***
- ***The secant modulus of elasticity*** at a given stress is the slop of a line through the origin and through the point on the curve represent that stress .
- Modulus of elasticity of concrete using SBC 304 Formula for normal weight concrete section 8.5 .

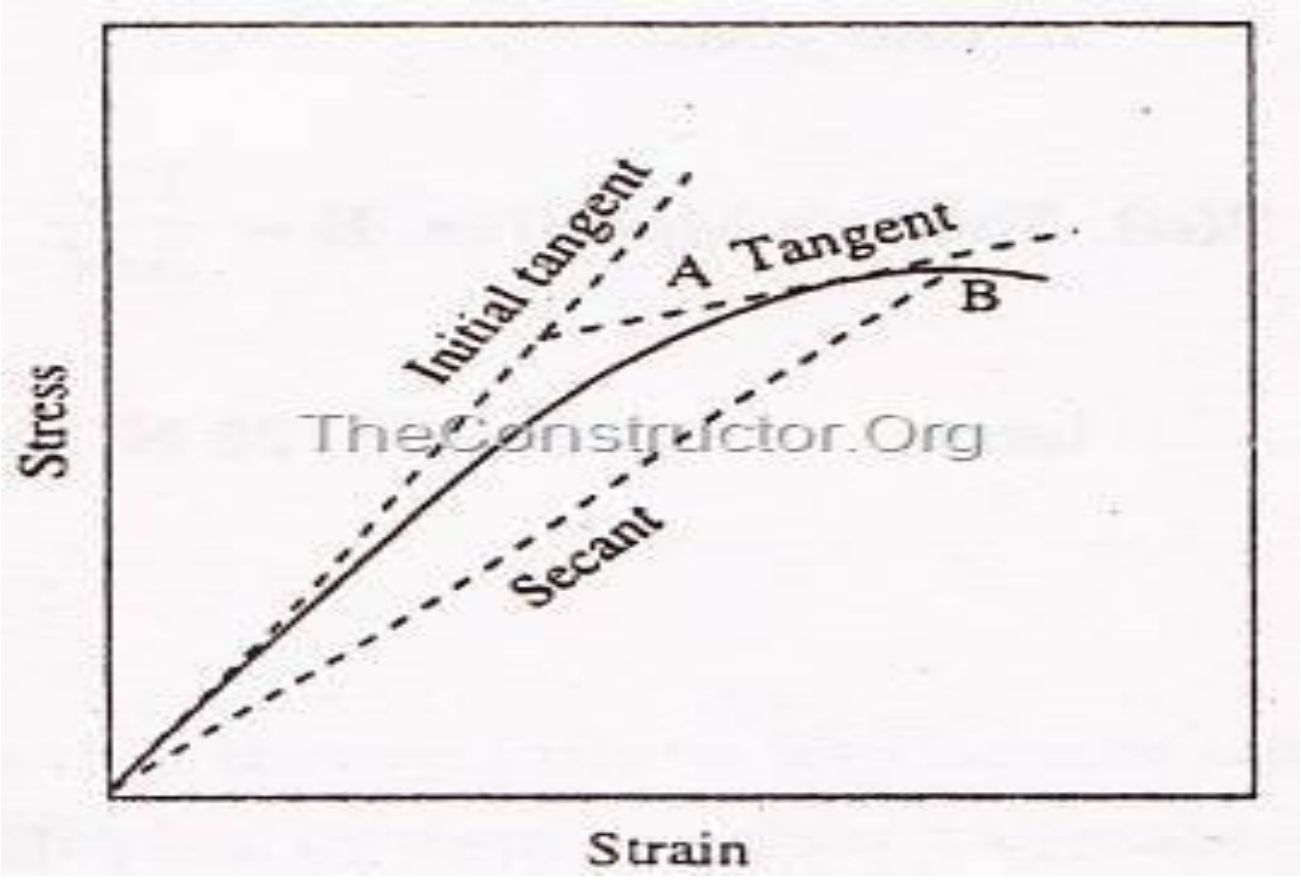

Fig . 1

Equation :-

$$\sigma = \frac{P}{A}$$

$$E = \frac{\sigma}{\varepsilon}$$

- **Stress – strain curve for steel :**

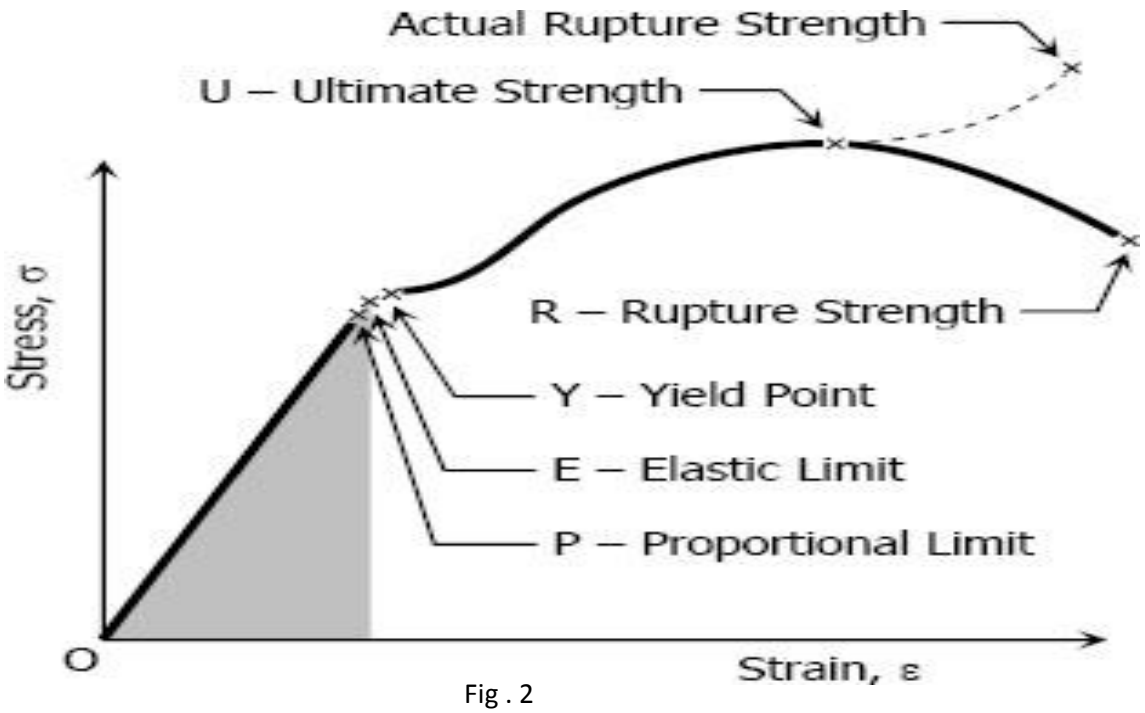

Fig . 2

- **Proportional Limit**

From the origin O to the point called proportional limit, the stress-strain curve is a straight line

- **Elastic Limit**

The elastic limit is the limit beyond which the material will no longer go back to its original shape when the load is remove .

- **Elastic and Plastic Ranges**

The region in stress-strain diagram from O to P is called the elastic range. The region from P to R is called the plastic range

- **Yield Point**

Yield point is the point at which the material will have an appreciable elongation or yielding without any increase in load

- **Ultimate Strength**

The maximum ordinate in the stress-strain diagram is the ultimate strength or tensile strength.

- **Rapture Strength**

Rapture strength is the strength of the material at rupture. This is also known as the breaking strength