* Creep test

* Creep is the plastic deformation due to a loading that is applied for ① Long Time
② at high temperature

* Creep → Strain vs. time

$$\frac{Strain}{time} = Strain\ rate$$

$$\epsilon = \frac{\delta}{L}$$

Constant Load or Stress

Failure ✕4

Tertiary Creep

Secondary or Quasi-viscous Creep

Primary or Transient Creep

Strain or Extension

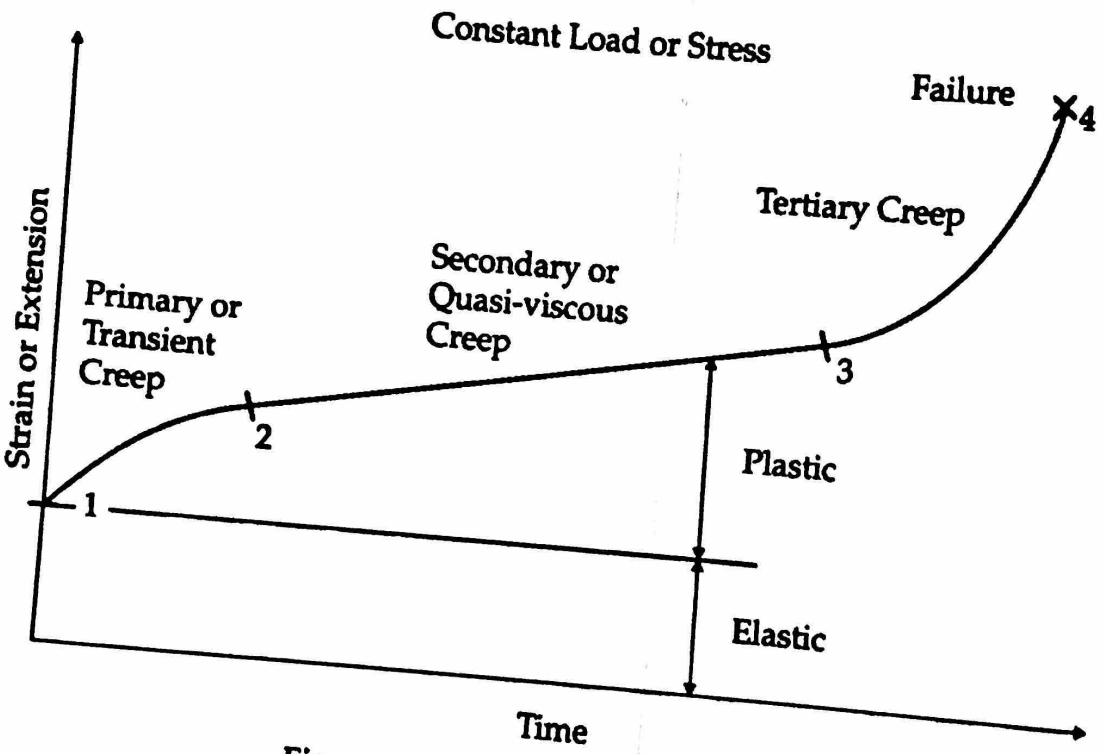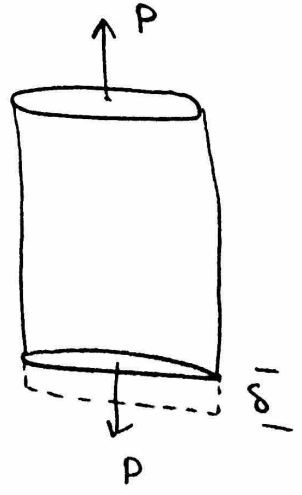3

2

Plastic

Elastic

1

Time

Figure 1 Typical Extension-Time Curve

δ : Deflection (Elastic deformation)

$$\epsilon = \frac{\delta}{L}$$

Keep load on for long time and at High temperature
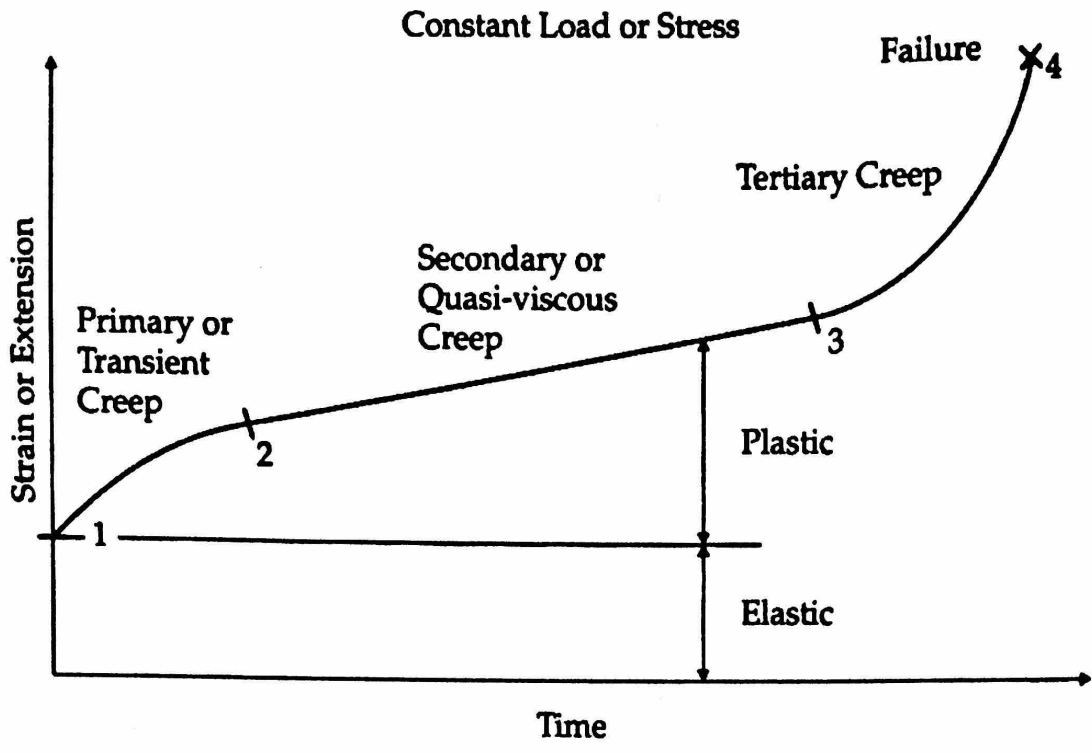⟹ plastic Deformation
" Creep "

↑ P

P

δ

Figure 1 Typical Extension-Time Curve

Three Stages of Creep

① Between point 1 and point 2 → Primary or transient creep

   ↗ stage 1   " strain rate ↓ "

② Between point 2 and 3 → Secondary creep

   ↗ stage 2   " strain rate constant -

③ Between point 3 and 4 → Tertiary creep

   " strain rate ↑ "

※ what we will do in the lab?

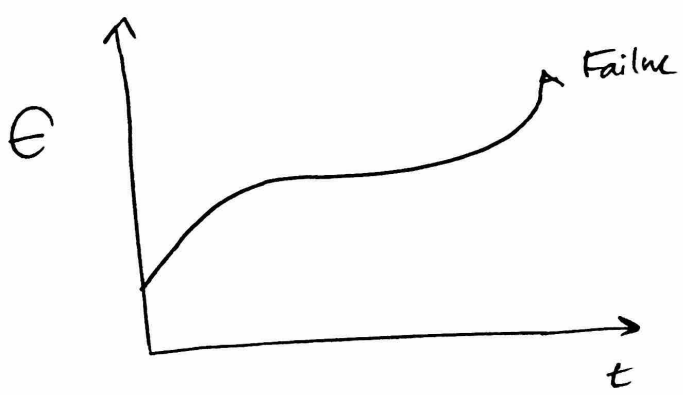Creep test ⟶ Apply load at high temperature
and long time

⟶ every 5 minutes, measure δ and

Find $\epsilon = \dfrac{\delta}{L}$

⟶ For one (or more) hour or till failure

⟶ data $\underset{\text{strain}}{\epsilon}, \underset{\text{Time}}{t}$

plot ϵ, t

Find all stages
① ,② and ③