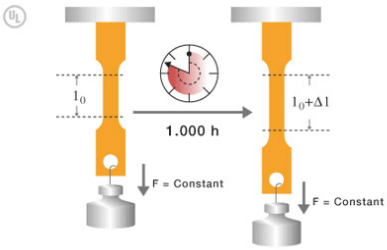
Experiment 3

Creep testing of polymers

Creep is defined as the time-dependent deformation at elevated temperature (T>40%Tm) and constant stress. (failure happens under yield stress)

Sometimes called cold flow, which is the tendency of a material to move slowly or deform permanently under the influence of constant load.

Can happen in low melting material, like polymers or even in high melting material like steel in high temperature, like can engines, power plants, nuclear plants, boilers, gas turbines, jet engines, ovens, or any application that involves high temperatures under load...



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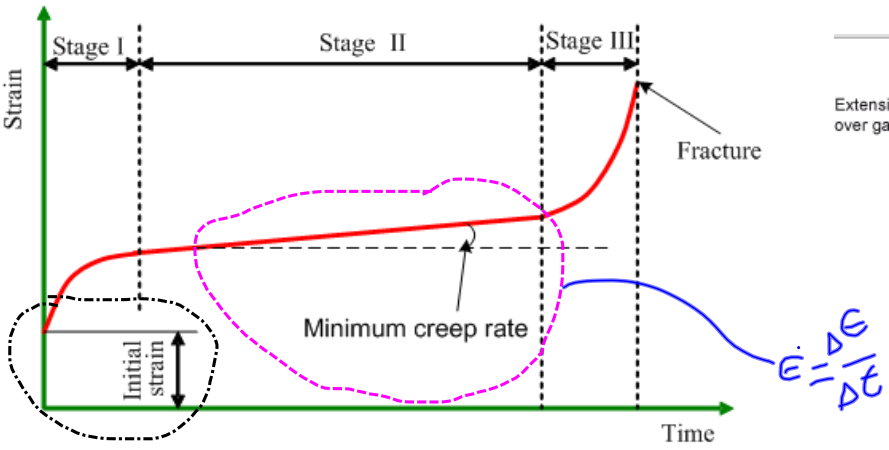
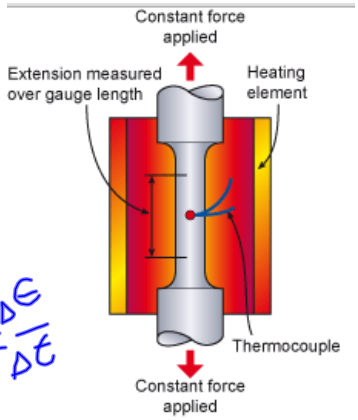
Creep behavior





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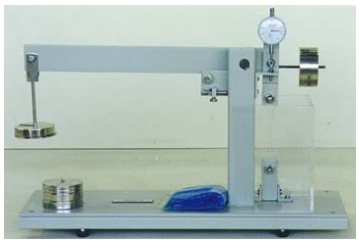

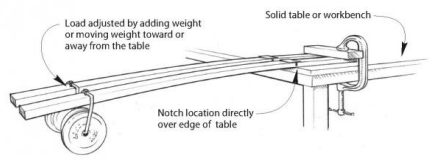

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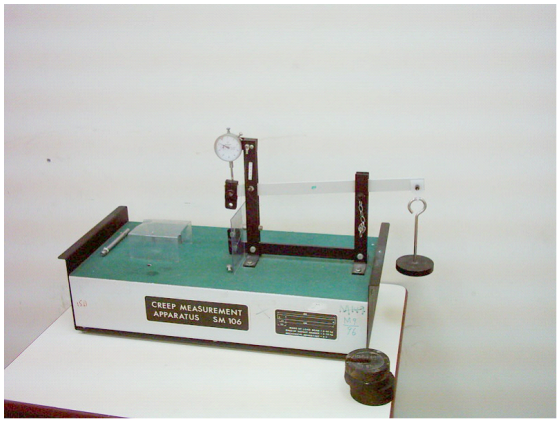
Creep

Click to start

Creep Test of Polymers



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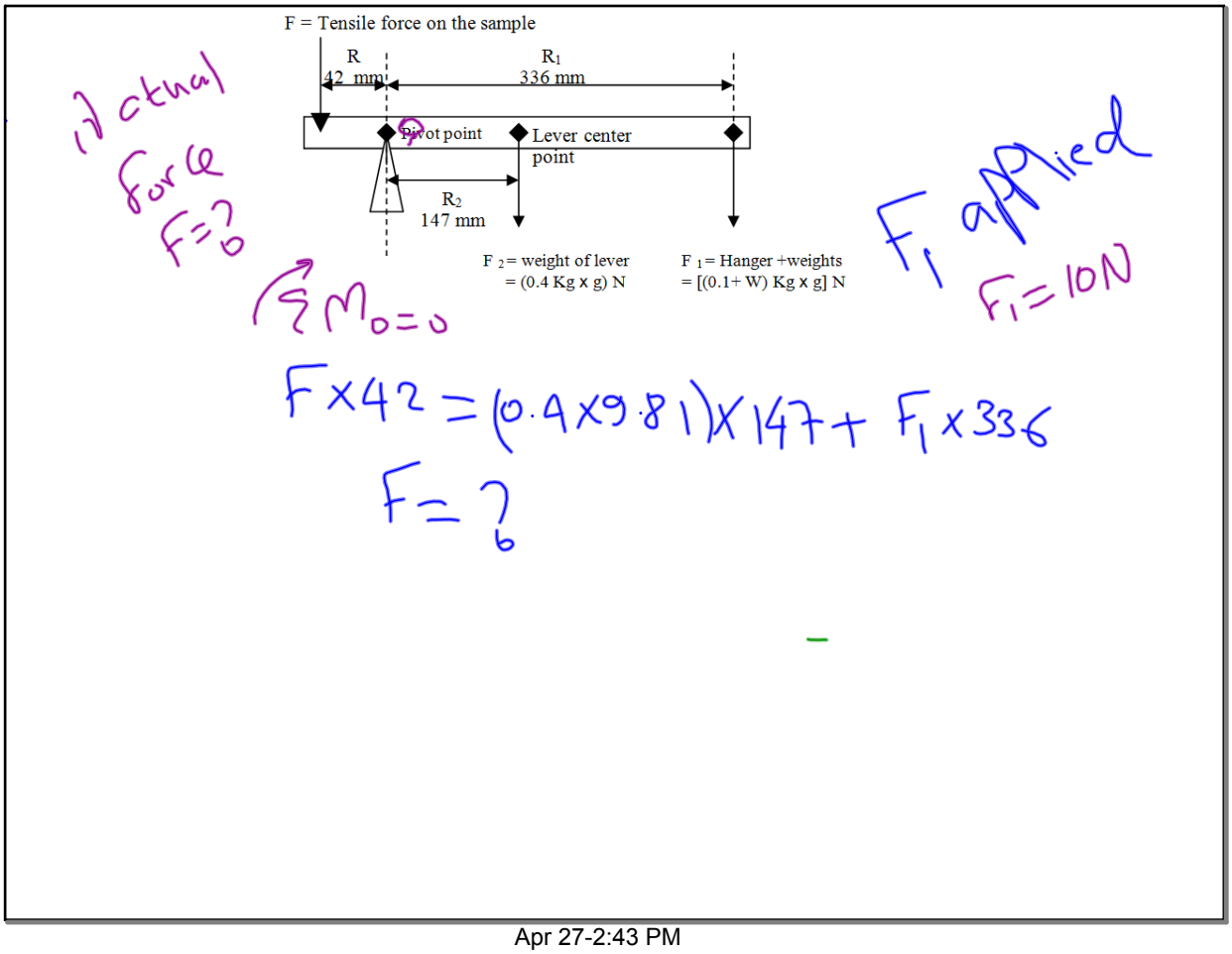

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time(s)	Δ (mm)	time(s)	Δ (mm		
0		960			
10					
20					
40					
60					
120					
240					
480					

2 min
4 min
8 min

Oct 11-2:42 PM

Calculated

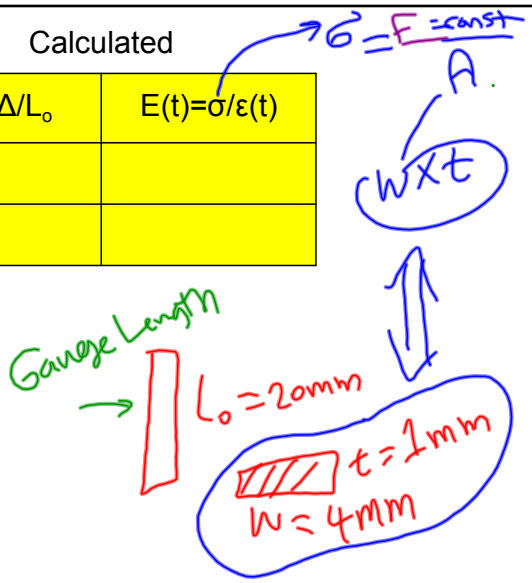
time (s)	Δ(mm)	$\varepsilon(t)=\Delta/L_o$	$E(t)=\sigma/\varepsilon(t)$

Δ: measured extension

ε(t): Strain rate

E(t): Time dependent Creep modulus

σ: Stress (Force/Area) constant



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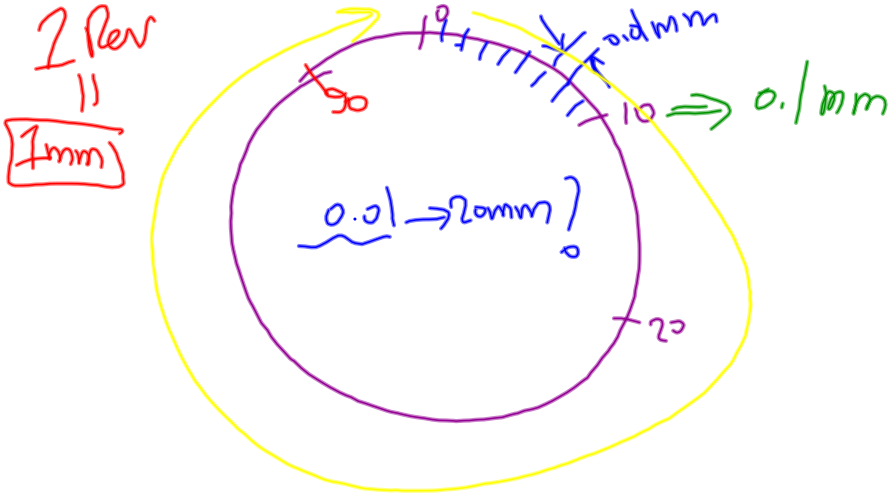

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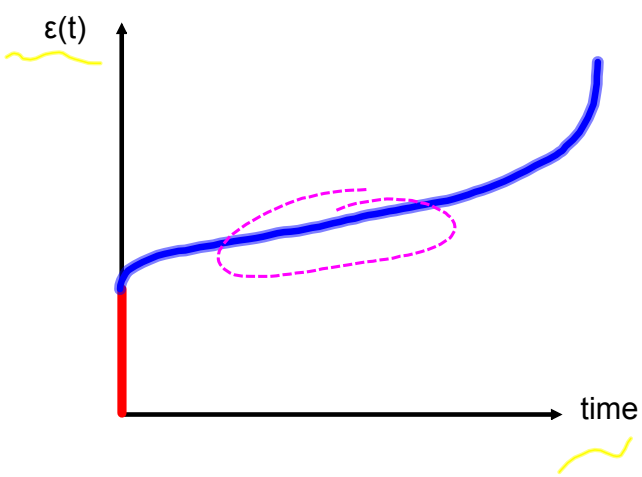
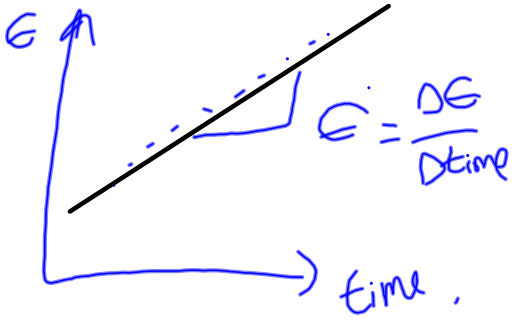


1. Show creep stages on curve.
2. Plot steady state in separate figure.
3. Estimate strain rate.



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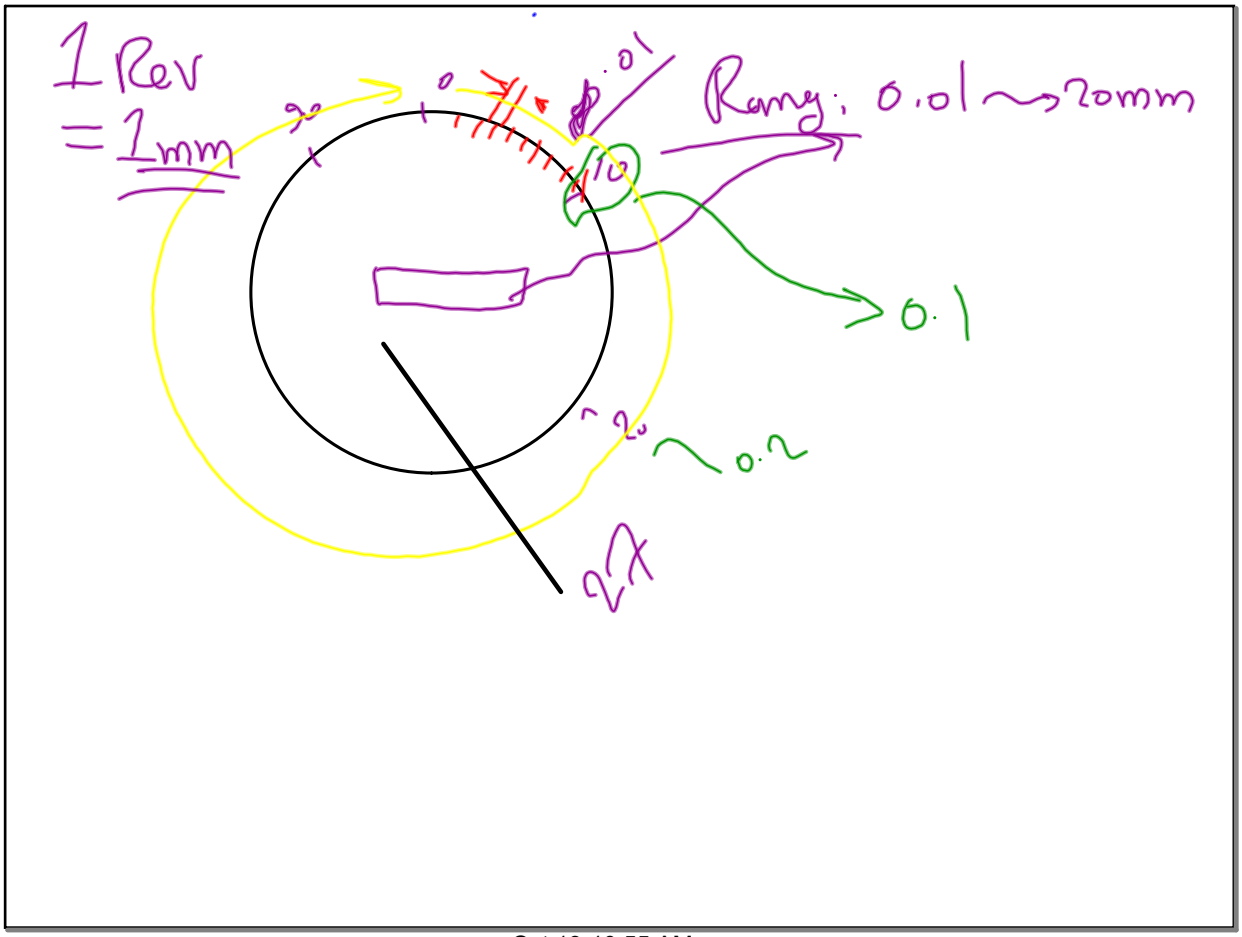

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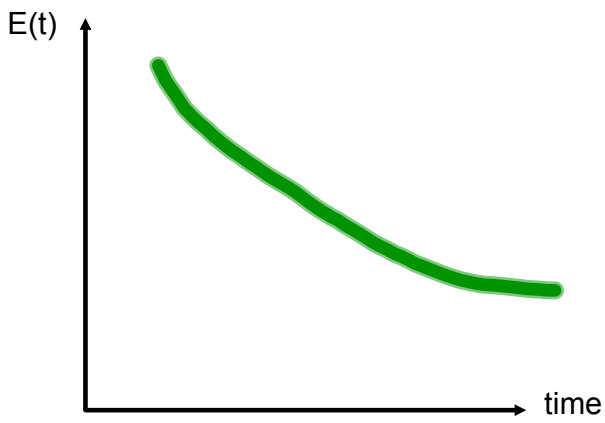

Plot E(t) versus time

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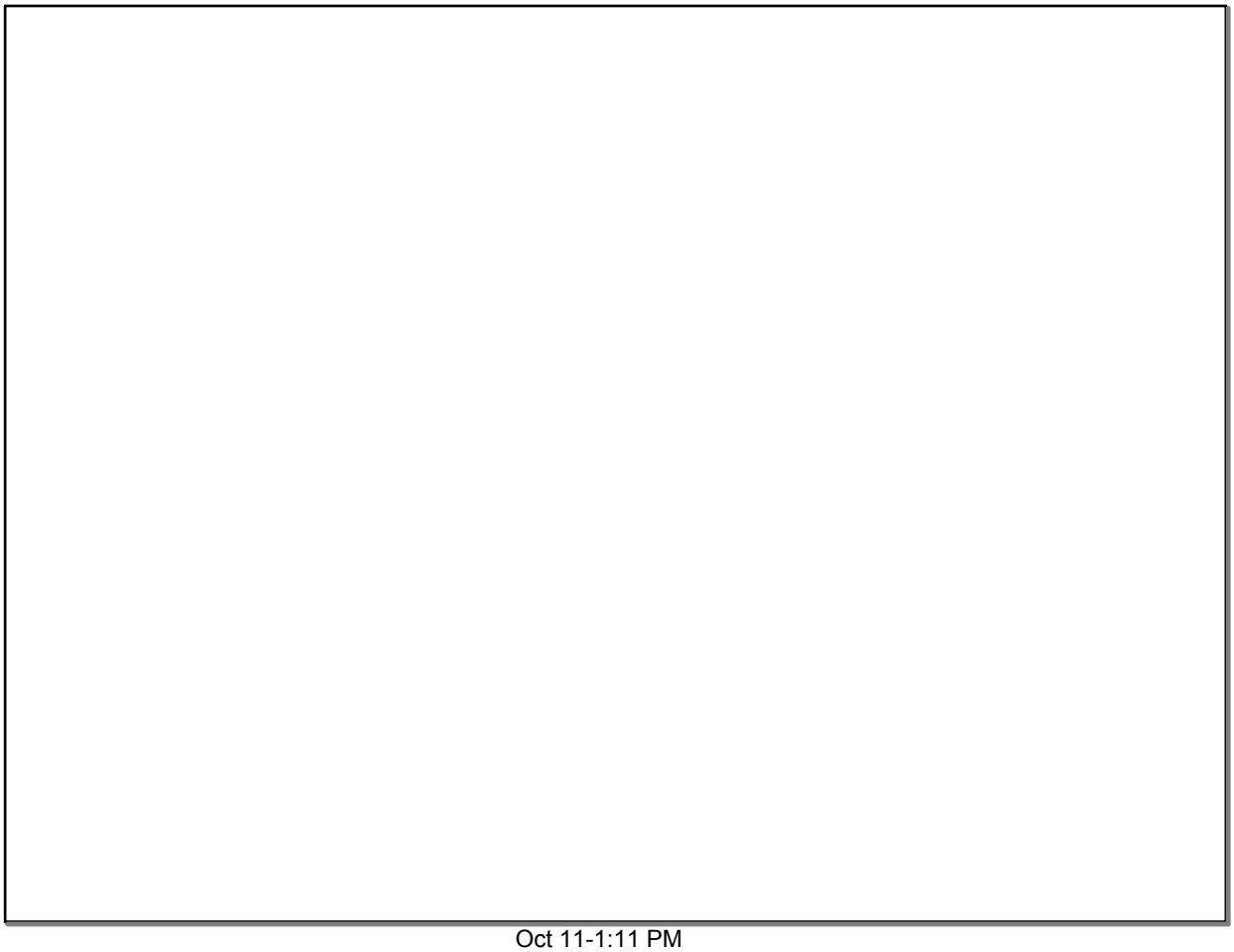
Answer Lab assignment questions

Add one page to the report about creep failure with photo

Apr 27-3:04 PM



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