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Creep Test

Specimen specifications:- made of Lead. –Dimensions :(2*5mm –Section), 20mm Length. - Applied mass: 1.5 Kg. - Ambient temperature: 14°C.

Time Minutes	Dial Gauge Extension mm (Ext.1)
15	4.90
30	5.17
45	5.27
60	5.36
75	5.39
90	5.40
105	5.48
120	5.52
135	5.56
150	5.58
165	5.62
180	5.64
240	5.74
300	5.85
360	5.95
420	6.11
480	6.18
540	6.27
600	6.45
660	6.60
690	6.71
720	6.86
735	6.92
750	6.94
765	7.01
780	7.15
795	7.10

- Plot Strain against Time(s), the slope of the curve at the secondary region is the creep rate $\dot{\epsilon}$.
- Find the time required for each stage.



- Calculate the constant B.
- Discuss the advantages that can be obtained from the plot.
- State 2 applications where the creep test is essential in elements and members design.

Time(s)	Time Minutes	Dial Gauge Extension mm (Ext.1)	Dial Gauge Extension mm (Ext.2)	strain
900	15	4.90	2.45	0.1225
1800	30	5.17	2.585	0.12935
2700	45	5.27	2.635	0.13174
3600	60	5.36	2.68	0.133
4500	75	5.39	2.695	0.1347
5400	90	5.40	2.7	0.135
6300	105	5.48	2.74	0.137
7200	120	5.52	2.76	0.138
8100	135	5.56	2.78	0.139
9000	150	5.58	2.79	0.1395
9900	165	5.62	2.81	0.1405
10800	180	5.64	2.82	0.141
14400	240	5.74	2.87	0.1435
18000	300	5.85	2.925	0.14625
21600	360	5.95	2.975	0.14875
25200	420	6.11	3.055	0.15275
28800	480	6.18	3.09	0.1545
32400	540	6.27	3.135	0.15675
36000	600	6.45	3.225	0.16125
39600	660	6.60	3.3	0.165



41400	690	6.71	3.355	0.16775
43200	720	6.86	3.43	0.1715
44100	735	6.92	3.46	0.173
45000	750	6.94	3.47	0.1735
45900	765	7.01	3.505	0.17525
46800	780	7.15	3.575	0.17875
47700	795	7.10	3.55	0.1775

solution:

$$\text{Ext}(2) = \text{Ext}(1) / 2$$

$$= 4.90 / 2 = 2.6$$

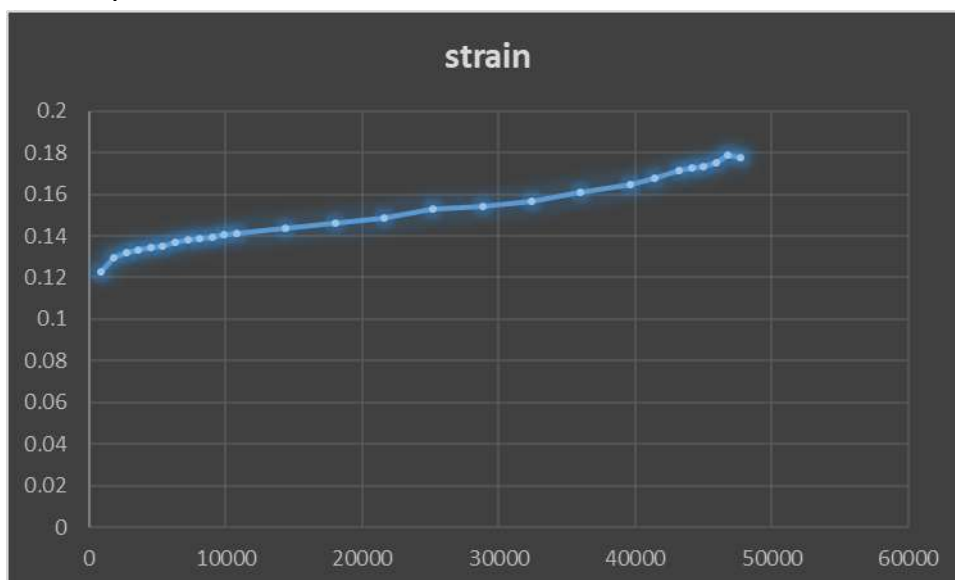
$$\text{Time}(s) = \text{time}(\text{min}) * 60$$

$$= 15 * 60 = 900$$

$$\text{Strain} = \text{Ext}(2) / 2 * \text{length}$$

$$= 2.45 / 20 = 0.1225$$

- Plot Strain against Time(s), the slope of the curve at the secondary region is the creep rate $\dot{\epsilon}$.



Creep rate $\dot{\epsilon}$.

$$\text{slope} = (1,6125 - 1,7150) / (18000 - 28800) = 4,04895 * 10^{-5}$$



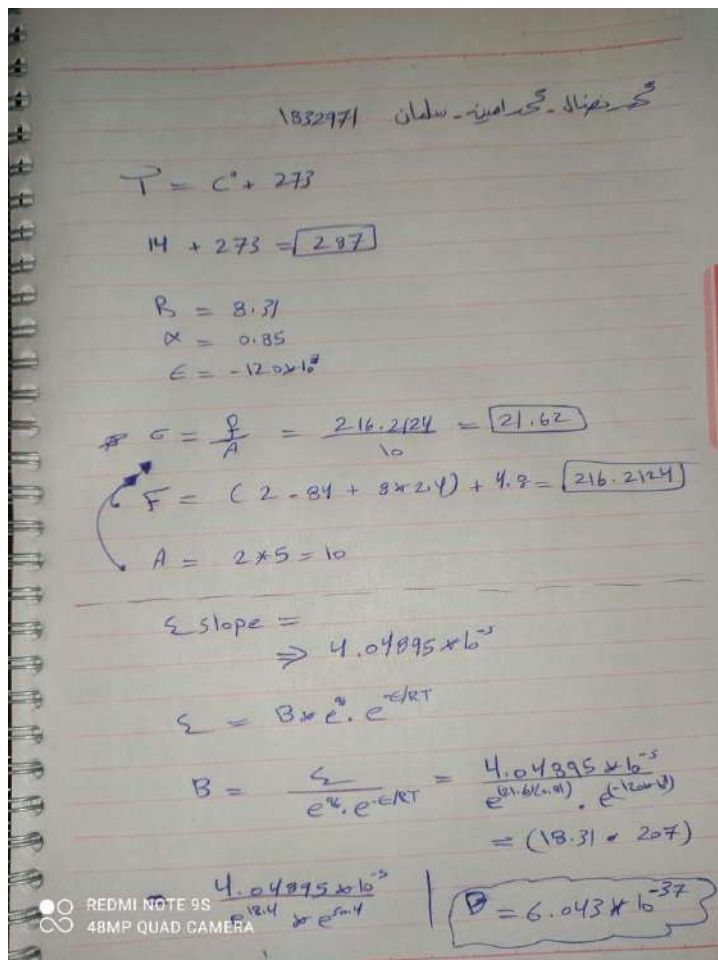
Find the time required for each stage.

Time required for the primary creep=(0-1500)

Time required for the secondary creep=(1500-3500)

Time required for the tertiary creep=(3500-47700)

- Calculate the constant B.



- Discuss the advantages that can be obtained from the plot.

1. to find the time of the material to fracture .



2. to find the strain
3. to find the secondary, primary ,tertiary.

The Hashemite University



Faculty Of Engineering

Mechanical Engineering Department

Strength Of Materials Lab

4. the property of creep in metals

- State 2 applications where the creep test is essential in elements and members design.

1.in the bridges

2.in the buildings

3.in cars

4.gas turbine engines