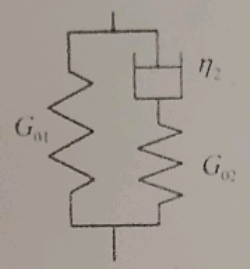
Class Test (CH21201)

1. A step strain (within linear regime) is imposed (t>0) on a viscoelastic material, whose rheological behavior can be predicted by the mechanistic model shown below. Plot stress as a function of time.

(10)



2. A polymer melt has undergone a cross-linking reaction for 5 hours to form a gel. Crosslinking density increases with time over these 5 hours. You have measured the stress relaxation after 5 hours by imposing step strain.

a) plot the stress decay as a function of time. **(5)**

b) based on the stress relaxation plot shown in (a), propose a mechanistic model which can capture the stress decay of PDMS chemical gel formed at the end of 5hrs. **(5)**

c) Derive an expression for relaxation modulus for the chemical gel using the model proposed in (b).

(5)