

- 1- A survey of the stresses at the critical points of machine member was carried out and the value of the maximum and minimum stresses at points A, B, C were as follows:

	A	B	C
σ_{\max} , Kg/mm ²	+12	+8	+4
σ_{\min} , Kg/mm ²	-8	zero	-2

If the properties of the steel member were as follows: Tensile strength = 40 kg/mm², yield strength = 24 kg/mm², and endurance limit = 20 kg/mm². Using Soderberg rule show whether this member is safe or not if the factor of safety = 2 for static load and = 3 for fatigue loading.

- 2- A part of machine is subjected to repeated load of mean stress equals to 1260 kg/cm². Find the max. and min. stresses using Gerber's, Goodman's and Soderberg's rules. The tensile strength of the material is 4200 kg/cm², yield strength is 3360 kg/cm² and the fatigue limit is 2100 kg/cm².
- 3- A part of machine is subjected to repeated load change from +3 to +1 tons. Find the cross section area of this part using Goodman rule. The factor of safety = 2, the tensile strength of the material = 40 kg/mm², yield strength = 24 kg/mm² and the fatigue limit = 18 kg/mm². Find also the cross section area of the part using Soderberg' rule.
- 4- The number of cycles to failure from the S-N curve for a certain steel are:

Stress, MN/m ²	Number of cycles to failure, cycles
350	2 000 000
380	500 000
410	125 000

If a component manufactured from this steel is subjected to 600 000 cycles at the stress 350 MN/m² and 150 000 cycles at the stress 380 MN/m². How many cycles can the component withstand at 410 MN/m² before fatigue failure occurs. Assuming that Miner's cumulative damage theory applies.