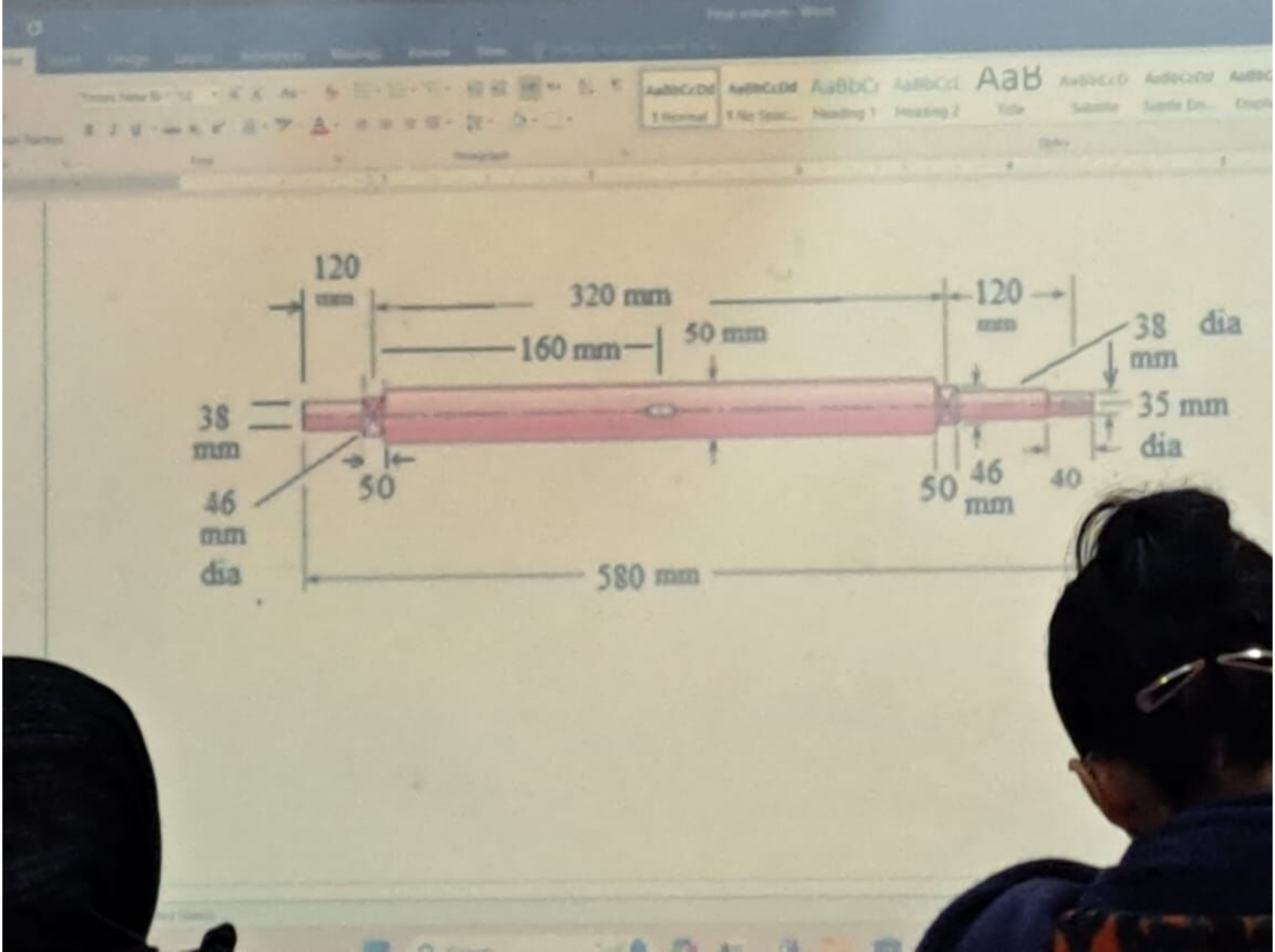
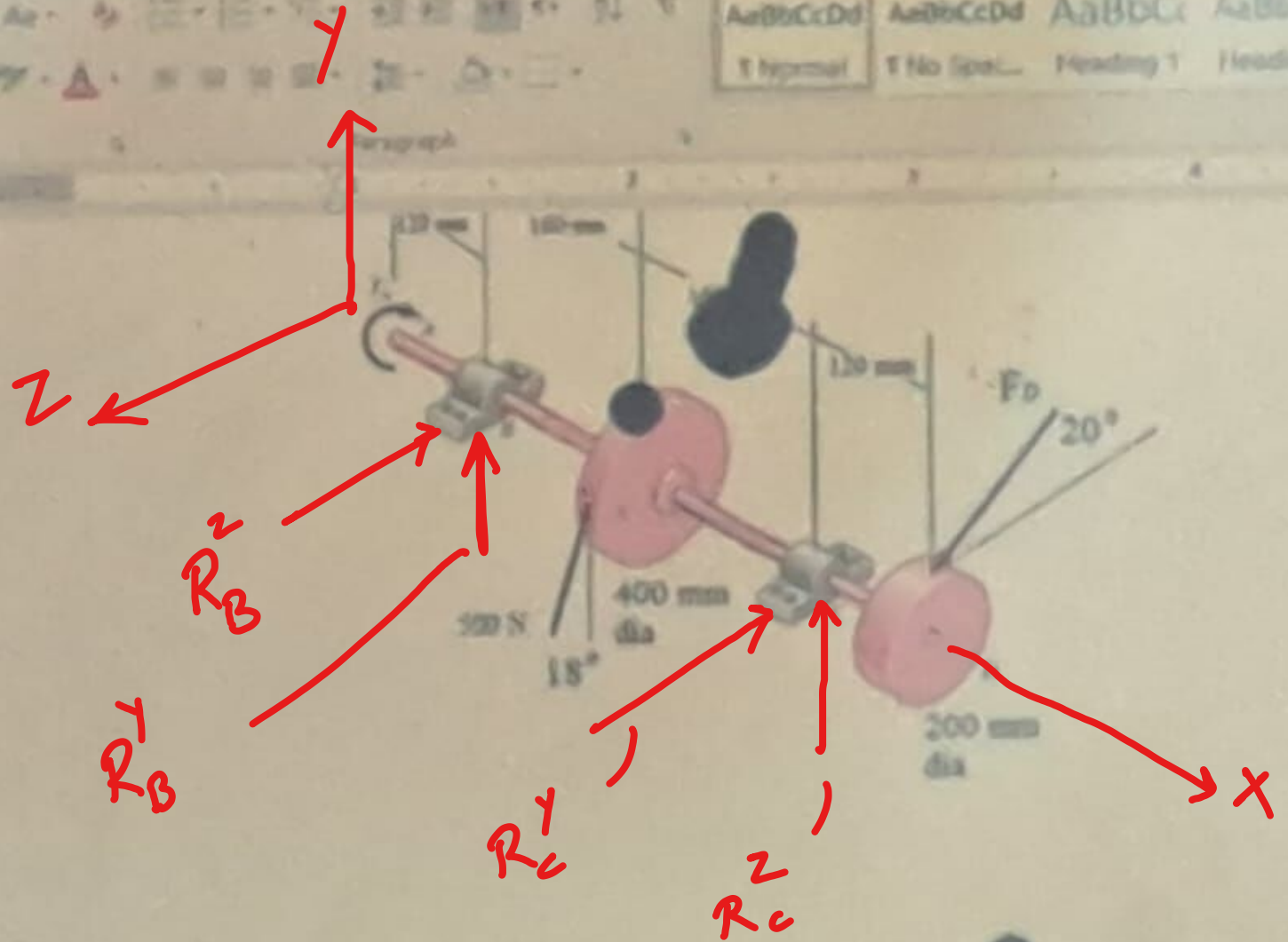

120
mm
320 mm
120
mm
38 dia
mm
160 mm
50 mm
35 mm
dia
38
mm
50
50
46
mm
40
46
mm
dia
580 mm



The geometry details of the shaft are shown below:

Q(20points). The rotating solid steel shaft is simply supported by bearings at points *B* and *C* and is driven by pulley at *D*, which has a 200-mm diameter. The force F_D acts at a pressure angle of 20°. The shaft transmits a torque to point *A* of $TA = 340\ \text{N} \cdot \text{m}$.

The shaft material is SAE 1040 cold-rolled steel. The ratio r/d=0.15 for the two shoulders for the bearings. For the two key seats use the ratio r/d = 0.02

a- Draw the bending-moment diagram for the shaft

b-Determine the infinite-life fatigue safety factor for the shaft using the modified Goodman Criteria