ME 202 - Strength of Materials

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Disclaimer

This document is a compilation of the notes I made while taking the course ME 202 (Strength of Materials) in my 4^{th} semester at IIT Bombay. It is not meant to serve as a replacement for any formal textbook or lecture on the subject, since the theory is not discussed at all.

There will probably be many instances where I use certain common symbols without explicitly mentioning what they mean. It is to be assumed that they carry their usual meanings.

If you have any suggestions and/or spot any errors, you know where to contact me.

Contents

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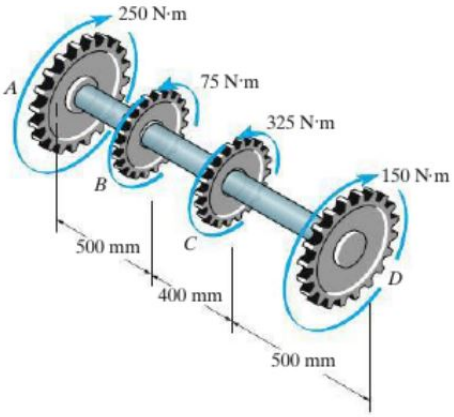
1 Torsion of Circular Shafts

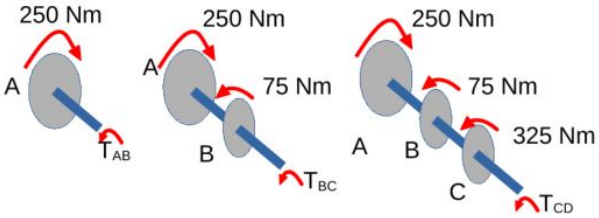
rod	axial loading	frame	axial as well as shear loading
beam	transverse/shear loading		
shaft	torsional loading		

- torque: causes twist or *torsion* in a machine element
- shaft: transmits rotary motion from one location to another

i) Internal resisting torque (method of sections)



FBDs at different sections:



$$\sum M_{AB} = 0 \implies -250 + T_{AB} = 0$$

$$\sum M_{BC} = 0 \implies -250 + 75 + T_{BC} = 0$$

$$\sum M_{CD} = 0 \implies -250 + 75 + 325 + T_{CD} = 0$$

Direction of torque is determined using right hand thumb rule, i.e. thumb along +ve z-direction and direction of curling of fingers corresponds to +ve torque.