

Mansoura University
Faculty of Engineering
Textile Engineering Dept.
First Term

Weaving Machine Design Third Year Textile Time: 2 hours

Date: 30/12/2012

Please answer two only of the following questions:

Question number one [30 degrees]:

Two helical springs of the same material (permissible shear stress is 3800 kN/cm², and modulus of rigidity is 9000 kN/mm²), and free length are used to make a concentric spring. The concentric spring is compressed 2.4 cm by an axial load of 315 kN. Design and draw the concentric spring assuming that spring index of both springs is 6. Compute the energy stored in each helical spring.

Question number two [30 degrees]:

Design and draw a right-angled bell crank lever to raise a vertical load of 880 kp at the longer arm end. The arm lengths are 63 cm and 16 cm. The permissible stresses in shear and tension for the lever and pin materials must be below 6500 N/cm² and 8700 N/cm², respectively. Maximum bearing stress of pins is 14 N/mm².

Question number three [30 degrees]:

- a) Draw a helical spring of circular wire and -in terms of load, dimensions, and material- express:
 - max. shear stress,

- angular deflection,

- spring rate,

- energy stored, and
- volume of spring wire.
- b) Draw leaf springs and -in terms of load, dimensions, and materialexpress:
 - bending stress,

- bending deflection,
- bending stress in laminated leaves,
- load shared by full- length and graduated leaves,
- deflection in full-length and graduated leaves, and

- load in clip bolt required to equalize stress in leaves.
- c) Assume reasonable values and estimate factors in a). and b).

Question number four [30 degrees]:

- (a) Draw a sketch for a cranked lever of the following dimensions:
 - * handle length = 300 mm,
 - * lever arm length = 400 mm, and
 - * overhang of the journal = 100 mm.
- (b) Determine handle diameter, lever arm cross- section, and journal diameter if:
 - * effort = 400 N,

bending stress = 50 N/mm², and

* shear stress = 40 N/mm^2 .

With my best wishes

Dr. Hamdy Ahmed Abd Allah Ebraheem