Bachelor of Mechanical Engineering 1st Year 2nd Semester (Old) Examination, 2017

Subject : Strength of Material

F.M. 100   Time : 3 hrs

Answer any five questions :

1. (a) Refer to Fig A and find out the elongation of the tapered rod due to tensile load P.

(b) Refer to Fig B. and find out the elongation of the conical rod due to its self weight. Take specific weight as w and Young's modulus as E.   10+10

2. (a) Deduce the expression for angle of twist mentioning all necessary assumptions.

(b) A power transmission shaft transmits a power of 200 HP at 105 rpm. If the shaft is hollow and its outside diameter is d, inside diameter d/2 and maximum allowable shear stress is 84 MPa, find out the shaft diameters.   10+10

3. (a) Deduce the expression of circumferential stress and longitudinal stress for a thin walled cylindrical pressure vessel.

(b) Find out the volumetric strain of thin walled spherical pressure vessel subjected to an Internal pressure p. (make all necessary assumptions)   10+10

4. Refer to fig C and draw the Mohr's circle. Using the Mohr's circle, find out the normal stress and shear stress on the inclined plane shown in the figure and also find out principal stresses and locate the principal planes.   20

5 (a) Refer to Fig. D and draw the shear force and bending moment diagrams.

(b) Deduce the expression for shear stress in case of a beam with ordinary bending. 10+10

6 (a) Refer to Fig E and find out the maximum deflection.

(b) Deduce the expression of critical buckling load for both side pin ended column. 10+10

7. Write short notes on any four :   4 X 5

(a) Williot Diagram

(b) Strain rosette

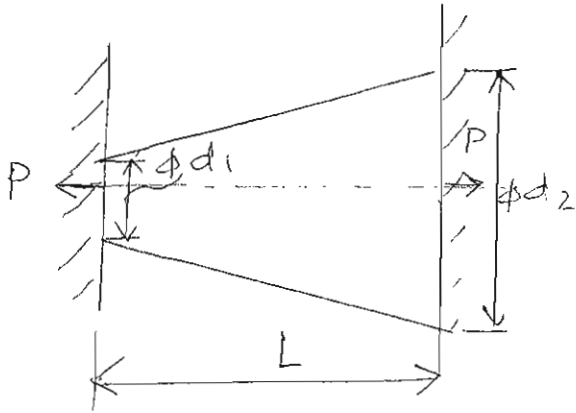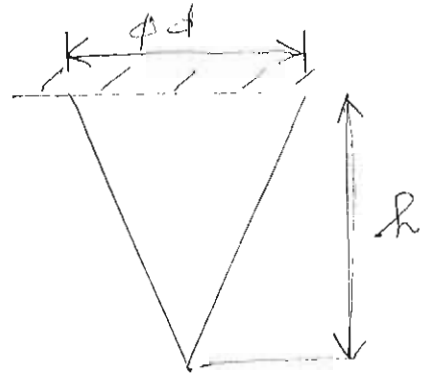(c) Flexural rigidity and torsional rigidity

(d) Closed coil helical spring

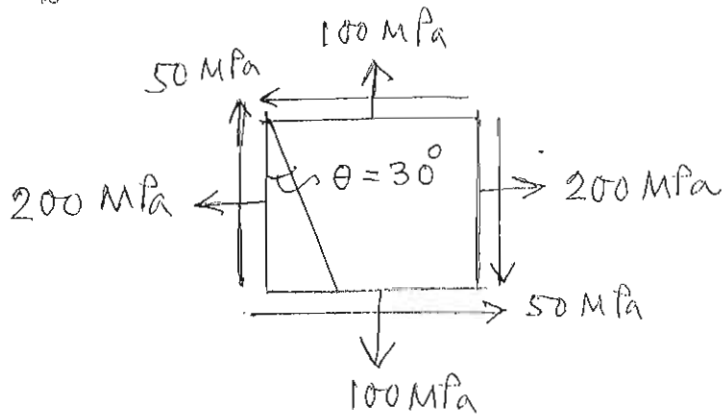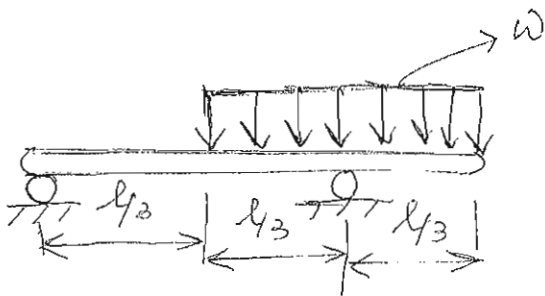(e) Slenderness ratio.

Fig A.

Fig. B

Fig C.

Fig D.

Fig E.