The Hashemite University
DEPARTMENT OF MECHANICAL ENGINEERING
Machine Elements Design

Part One (Closed Book) 28-10-2010

Student Name: Student No.:

Problem I. [7 points]

1-1. In case of pressure vessels having open ends, the fluid pressure induces

a. longitudinal stress b. circumferential stress c. shear stress d. none of these

1-2. In an internally pressurized thin-walled cylinder, the longitudinal stress is …… of the circumferential stress

a. One-half b. two-third c. three-fourth d. none of these

1-3. In an internally pressurized thick-walled cylinder, the tangential stress across the thickness of the cylinder is

a. maximum at the outer surface and minimum at the inner surface
b. maximum at the inner surface and minimum at the outer surface
c. maximum at the inner surface and zero at the outer surface
d. maximum at the outer surface and zero at the inner surface

1-4. In an internally pressurized thick-walled cylinder, the maximum radial stress at the outer surface is

a. zero b. P c. $-P$ d. $2P$

1-5. The design of the pressure vessel is based on

a. longitudinal stress b. hoop stress c. longitudinal and hoop stresses d. none of these

1-6. The principal stresses using Mohr's circle technique are

a. (-40, -10, 20) ksi b. (40,- 20, 10) ksi
c. (40, 20, -10) ksi d. (-40, 20, -10) ksi

1-7. The maximum shear stress using Mohr's circle technique is

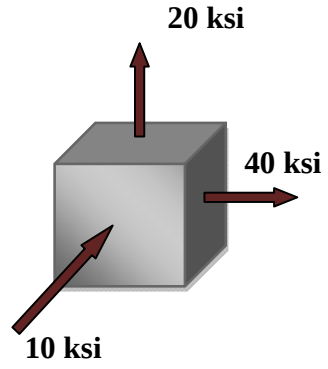
a. 10 ksi b. 15 ksi c. 25 ksi d. 30 ksi

1-8. The principal angle ϕ_p on the element is

a. 45^o b. 0.0^o c. 60^o d. 90^o

1-9. The maximum shear angle ϕ_s on the element is

a. 45^o b. 0.0^o c. 60^o d. 90^o



1-10. Circle the correct principal orientation corresponding to the stress state shown in Fig. 1.

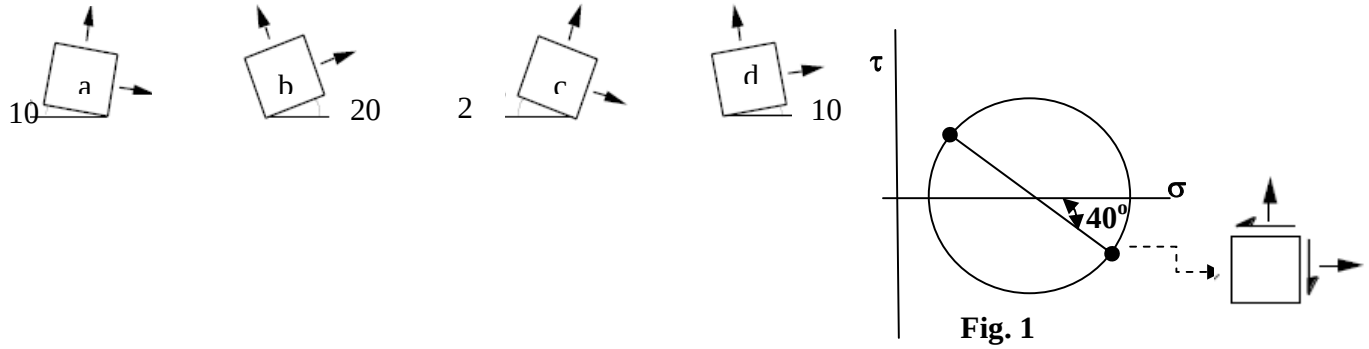


Fig. 1

1-11. The normal strains due to temperature change are

a. $\alpha \Delta T$ b. $\alpha \Delta T/E$ c. zero d. $0.5\ \alpha \Delta T/E$

1-12. When the material is loaded within elastic limit, then the stress …… to the strain

a. equal b. directly proportional c. inversely proportional d. none of these

1-13. The cold working process on a metals is carried out at a temperature

a. equal to the recrystallization temperature b. bellow the recrystallization temperature

c. above the recrystallization temperature d. all of the above are correct

1-14. In static loading, stress concentration is more serious in

a. ductile material b. brittle material

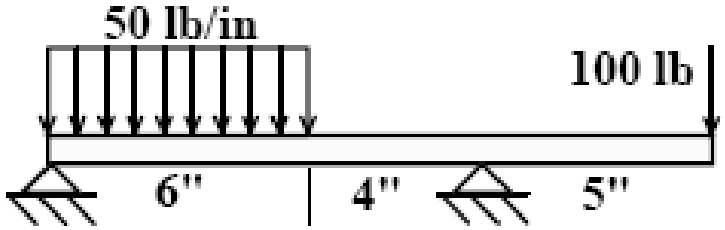
c. elastic material d. brittle as well as ductile material

1-15. [3 Points]

For the beam shown in the Figure bellow

(i) Determine the values of the maximum shear force and maximum bending moment.

(ii) Drew the shear and moment diagrams.



$|V_{max}| =$ _____

$|M_{max}| =$ _____