MEEG 3013

Name: _____

(Underline your last name.)

Test II ( )

ID #: _____

1. (30%) For the beam shown, (a) draw the free-body, shear, and bending-moment diagrams, (b) write the equations defining the shear V and bending moment M using singularity functions, (c) determine the maximum bending moment M_{max} based on the equations for V and M.
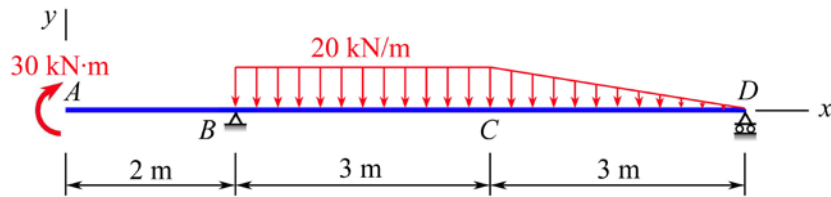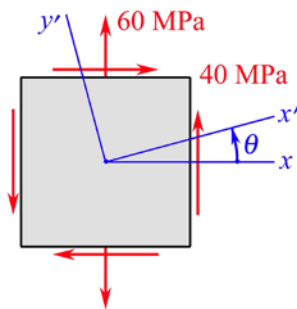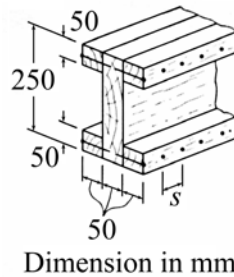

Fig. P1

Fig. P2

Dimension in mm

Fig. P3A

Fig. P3B&C

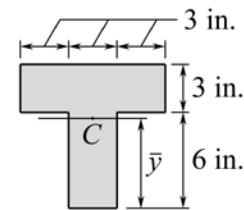**2.** (30%) For the state of stress shown, *draw* and *use* Mohr's circle to determine the range of values of θ for which the normal stress acting on the plane normal to the x' axis is $\sigma_{x'} \le 75$ MPa.

3. *Circle on this test sheet* the nearest item for each of the following:

A. (7%) The built-up wooden beam shown is subjected to a vertical shear of 5 kN. If the spacing of nails is $s = 45$ mm and each nail is 90 mm long, the shearing force in each nail is
(a) 404 N. (b) 390 N. (c) 377 N. (d) 363 N. (e) 350 N. (f) 336 N.

B. (6%) The centroid of the composite section shown is at C. The value of $\bar{y} - 0.35$ in. is
(a) 5.65 in. (b) 5.55 in. (c) 5.45 in. (d) 5.35 in. (e) 5.25 in. (f) 5.15 in.

C. (7%) If the cross section of the beam is subjected to a vertical shear of 2100 lb, the maximum shearing stress is
(a) 116.5 psi. (b) 110.9 psi. (c) 105.4 psi. (d) 99.8 psi. (e) 94.3 psi. (f) 88.7 psi.

4. (20%) Non-numerical problem.

A. (6%) Define (a) the principal plane of stress, (b) the principal stress.

B. (6%) Define the *values* for the singularity functions: (a) $<x-a>^n = ?$ (b) $\int_{-\infty}^{x} <x-a>^n \, dx = ?$

C. (5%) What do the *abscissa* and *ordinate* of a point on Mohr's circle for state of stress represent?

D. (3%) What does the *radius* of Mohr's circle for state of stress represent?