UNIVERSITY OF ARKANSAS

Ph.D. Qualifying Exam – Mechanics of Materials (Summer 2010)

Closed books & closed notes

(Time: 2 hours)

Name:_____

ID #:_____

1. A beam *AD* having a constant flexural rigidity *EI* is supported and loaded as shown in Fig. 1. Determine (*a*) the reaction forces $\mathbf{A}_y$ and $\mathbf{C}_y$ at *A* and *C*, (*b*) the slopes θ_A and θ_B at *A* and *B*, (*c*) the deflection y_B at *B*.

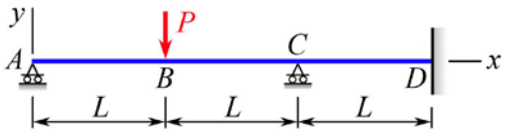

Fig. 1

2. ***A***. Describe the *principle of moments*. ***B***. For the beam shown in Fig. 2, consider section *n-n* and determine (*a*) the shearing stress τ_a at point *a*, (*b*) the shearing stress τ_b at point *b*.

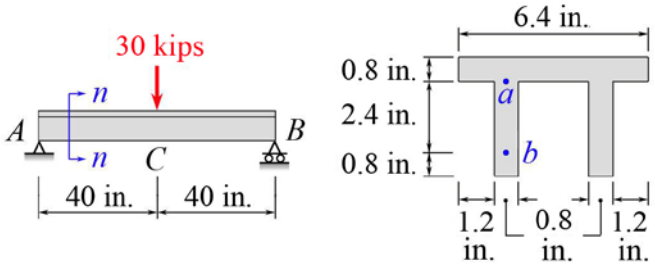

Fig. 2

3. The magnitude of tightening force in the clamp is *P* = 600 N. Knowing that point *C* is the centroid of section *a-a*, determine (*a*) the value of $\bar{y}$, (*b*) the stress σ_A at point *A*, (*c*) the stress σ_D at point *D*, (*d*) the value of *e* if the stress at *E* is zero, (*e*) the state of stress at point *B*.

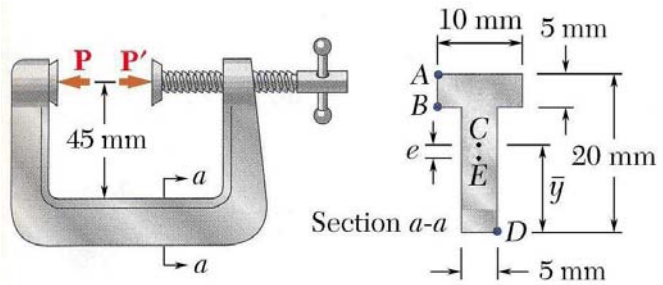

Fig. 3