## **WORK SHEET-ECCENTRIC LOADING**

## Equations

(1) Uniaxial Hooke's Law

$$\sigma_i = E\varepsilon_i$$

 $\sigma_i$  = stress at gage i location, psi

E = modulus of elasticity, psi

 $\varepsilon_i$  = axial strain on gage i, in/in

(2) Experimental Neutral Axis

$$y_{NA,exp} = \frac{-b_{exp}}{m_{exp}}$$

 $y_{NA,exp}$  = location of exp. NA, in

 $b_{exp}$  = y-intercept from regression, psi

 $m_{exp}$  = slope from regression, psi/in

(3) Theoretical Stress vs. Position

$$\sigma_{th} = \left(\frac{Pe}{I_c}\right) y - \frac{P}{A} = m_{th} y + b_{th}$$

 $\sigma_{\it th}$  = theoretical stress, psi

P = applied load, lb

e = load offset distance, in

y = position from centroid, in

A = cross sectional area, in<sup>2</sup>

 $I_c$  = moment of inertia about centroid, in<sup>4</sup>

 $m_{th}$  = slope of theoretical line, psi/in

 $b_{a}$  = intercept of theoretical line, psi

Results

| Experimental regression line equation   | Neutral axis | Neutral<br>axis | Max tensi    | le stress   | Max compressive stress |             |  |  |  |
|---|--------------|-----------------|--------------|-------------|------------------------|-------------|--|--|--|
| Theoretical stress vs position equation | experimental | Theoretical     | experimental | Theoretical | experimental           | Theoretical |  |  |  |
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## Comments

Attach the graphs of your data(Done in excel or using graph paper)

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