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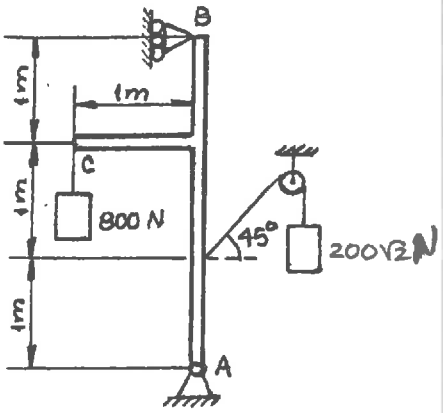
CONCORDIA UNIVERSITY
Faculty of Engineering and Computer Science

**ENGR 242/2 STATICS, Section V**
**TEST # 2**

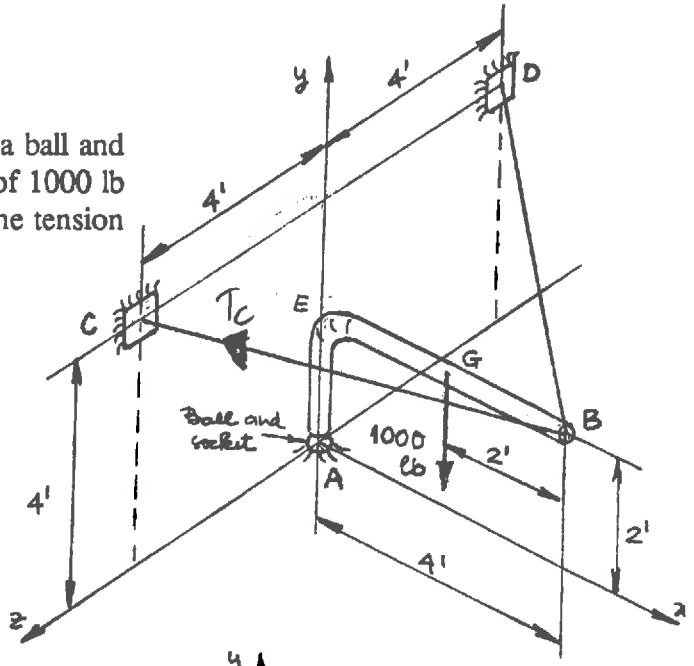
Attempt all questions, only calculators permitted. Time: 70 minutes

**MARKS**

20 **1.** The frame ABC is loaded as shown. Determine the reaction forces at pin A and roller support B.




40 **2.** The rigid L-shaped member AEB is supported by a ball and socket at A, and by two cables: BC and BD. A force of 1000 lb is acting on the member at G, as shown. Determine the tension in each cable.



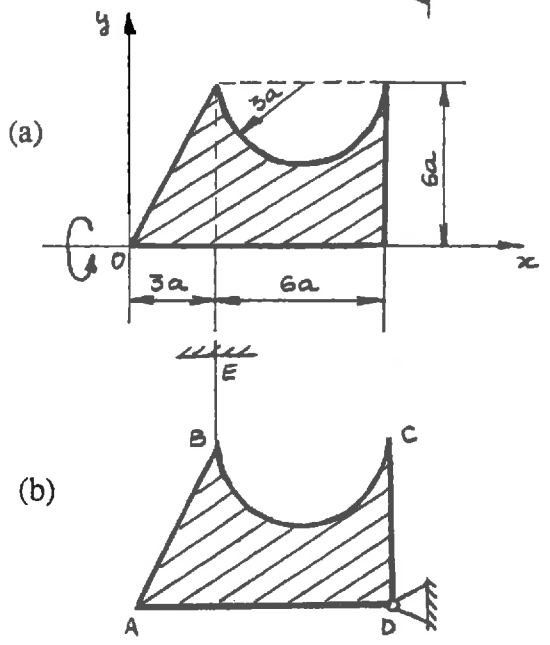

40 **3.** For the plate shown in Fig. (a) determine:

(1) the location of the centroid of the area;

$V = 2\pi \bar{y} A$

(2) the volume generated by a complete rotation of the shaded area about the x axis.

(3) If a = 0.1 m, and the specific weight of the material is $\gamma$ = 100 N/m$^2$, determine the tension in cable BE at equilibrium. The plate is pinned at D (Fig. (b)).



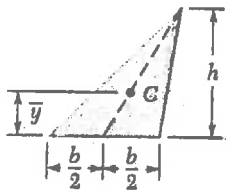
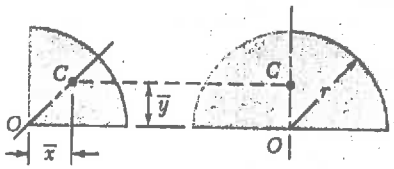
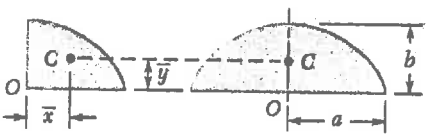
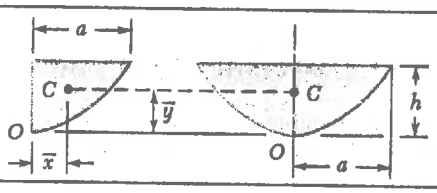
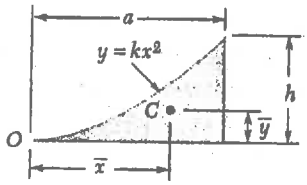
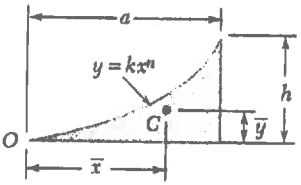
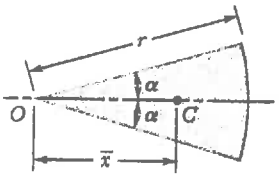
| Shape | | $\bar{x}$ | $\bar{y}$ | Area |
|---|---|---|---|---|
| Triangular area |  | | $\frac{h}{3}$ | $\frac{bh}{2}$ |
| Quarter-circular area |  | $\frac{4r}{3\pi}$ | $\frac{4r}{3\pi}$ | $\frac{\pi r^2}{4}$ |
| Semicircular area | | 0 | $\frac{4r}{3\pi}$ | $\frac{\pi r^2}{2}$ |
| Quarter-elliptical area |  | $\frac{4a}{3\pi}$ | $\frac{4b}{3\pi}$ | $\frac{\pi ab}{4}$ |
| Semielliptical area | | 0 | $\frac{4b}{3\pi}$ | $\frac{\pi ab}{2}$ |
| Semiparabolic area |  | $\frac{3a}{8}$ | $\frac{3h}{5}$ | $\frac{2ah}{3}$ |
| Parabolic area | | 0 | $\frac{3h}{5}$ | $\frac{4ah}{3}$ |
| Parabolic spandrel |  | $\frac{3a}{4}$ | $\frac{3h}{10}$ | $\frac{ah}{3}$ |
| General spandrel |  | $\frac{n+1}{n+2}a$ | $\frac{n+1}{4n+2}h$ | $\frac{ah}{n+1}$ |
| Circular sector |  | $\frac{2r\sin\alpha}{3\alpha}$ | 0 | $\alpha r^2$ |

**Fig. 5.8A** Centroids of common shapes of areas.