بسم الله الرحمن الرحيم

جامعة المنصورة
كلية الزراعة
قسم الهندسة الزراعية

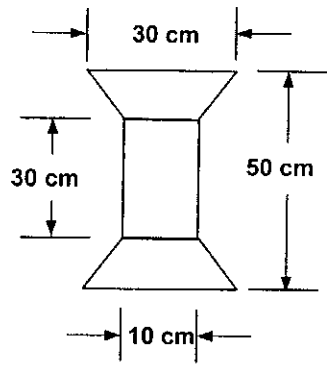
المادة : تحليل الإجهادات
الصف : الثانى شعبة الهندسة الزراعية
الأحد : ١٠ / ٦ / ٢٠١٢م

للطلاب المستجدين والممتحنين من الخارج

All the questions may be attempted:-

First question (15-mark)

An I iron beam having 5 m long, specific weight of 0.8 N/cm^3, and modulus of elasticity of 30 k/mm^2 is suspended under its own weight. Determine the total elongation of the beam, if the gross dimensions of this beam are as indicated in the following figure.



Second question (15-mark)

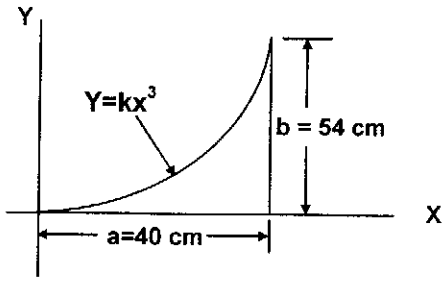
In punching a **25** mm diameter hole in steel plate **10 mm** thick, the punching operation causes a cylindrical plug of steel to be sheared out of the plate. Determine the required shear force if the ultimate shearing stress of the steel is **35 N/mm^2**. If the modulus of rigidity for the steel material is **8 kN/mm^2** and the shear stress is **245 N/mm^2**, calculate the shear strain at the edge of hole.

Third question (15-mark)

A shaft of **75 mm** is subjected to a torque T of **4.5 kN.m.** Compute the maximum unit shearing stress in the shaft (a) when the shaft is solid, and (b) when is bored in order to reduce weight and produce a tube of **7.5 cm** external diameter and **5 cm** internal diameter, (c) what is the unit shearing stress at the inner surface of the shaft?

Fourth question (15-mark)

Determine: (a) the entire area, (b) the centroid, (c) the moment of inertia with respect to the X and Y-axes of the parabolic segment shown in the following figure.



With my best wishes
Prof. Dr. Salah Mostafa Abdellati