

بسم الله الرحمن الرحيم

المادة : تحليل الإجهادات  
الصف: الثاني شعبة الهندسة الزراعية  
الأحد : ٢٦ / ٥ / ٢٠١٣ م

جامعة المنصورة  
كلية الزراعة  
قسم الهندسة الزراعية  
لطلاب المستجدين  
والممتحنين من الخارج

**All the questions may be attempted:**

**First question (15 marks)**

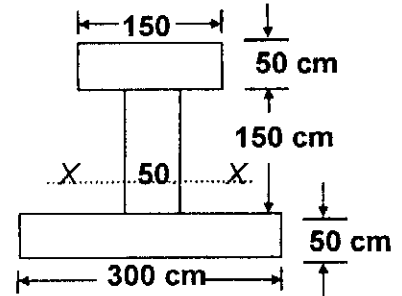
A steel tube, 50 mm outside diameter, 24 mm inside diameter, and 500 mm long, carries an axial tensile load of 105.8 kN. Determine the stress set up in the tube and its change in length when the load is applied. What further increase in load is possible if the stress in the tube material limited to 120 MN/m<sup>2</sup>? If the Young's modulus is 200 GN/m<sup>2</sup>, and the lateral strain is  $1.05 \times 10^{-4}$  mm/mm, determine the Poisson's ratio and the shear modulus of the steel tube.

**Second question (15-mark)**

Decide the dimensions of a hollow steel shaft with a diameter ratio of 3:4 which is required to transmit 110.55 hp at a speed of 210.1 rpm. The maximum shear stress in the shaft is limited to 70.755 MN/m<sup>2</sup> and the angle of twist to 3.8° in a length of 4 m. The modulus of rigidity for the shaft material is 80 GN/m<sup>2</sup>.

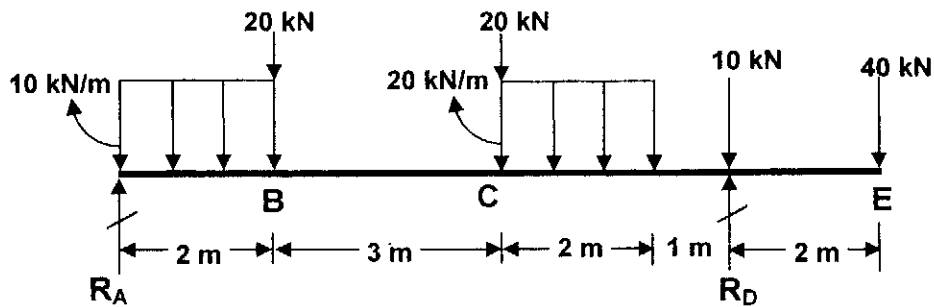
**Third question (15-mark)**

[1] Determine the location of the centroidal XX axis of the area shown in the opposite figure. Compute the moment of inertia and the radius of gyration using the transfer formula of parallel axes. Units in cm.



**Fourth question (15-mark)**

Determine the maximum shear force V and the maximum bending moment M in the overhanging beam shown in the following figure.



With my best wishes  
Prof. Dr. Salah, M. ABDELLATIF