جامعة المنصورة
كلية الزراعة
قسم الهندسة الزراعية

بسم الله الرحمن الرحيم
إمتحان مقرر
تحليل الإجهادات
للطلاب الممتحنين من الخارج

السبت : ٤ / ٦ /٢٠١٦ م
المستوى: الثانى
برنامج: الهندسة الزراعية والنظم الحيوية
الفترة : من ٩ - ١١

All the questions may be attempted:

First question (20-mark)

During a tensile test on a specimen, the following results were obtained:

Load, kN	0	15.7	24.5	36.3	32.4	39.2	46.1	52.0	54.0	49.1	39.2
Ext., mm	0	0.03	0.05	0.08	0.45	2.00	4.40	8.00	12.0	15.0	17.0

If the original diameter of metallic bar is 12.625 mm, diameter at rupture 7.15 mm and the length of metallic bar is 5 cm, determine the following:
(1) Tensile strength (3-mark). (2) Yielding stress (3-mark). (3) Percentage extension (3-mark). (4) Percentage reduction in cross section area (2-mark). (5) Modulus of toughness (3-mark). (6) Modulus of Elasticity (3-mark). (7) Modulus of resilience (3-mark).

Second question (20-mark)

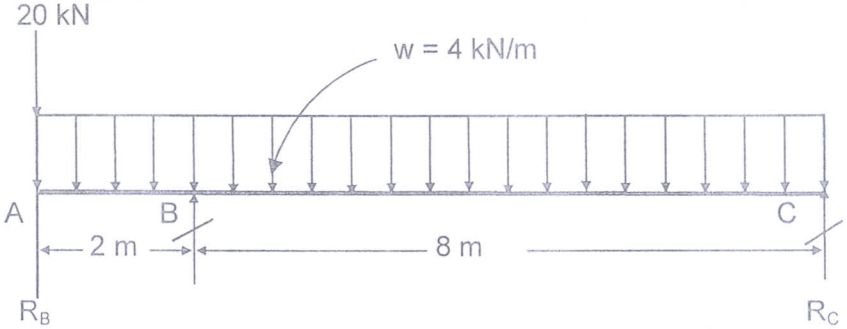
A solid shaft, 100 mm diameter and 10 m long, transmits a power of 75 kW at 150 rev./min (rpm). (a) Determine the maximum shearing stress set up in the shaft and the angle of twist, if the modulus of rigidity for the shaft material is 80 GN/m^2 (10-mark). (b) If the shaft is bored in order to reduce weight to produce a tube of 100 mm external diameter and 60 mm internal diameter, what torque could be carried by the tube if the same maximum shearing stress is not to be exceeded? If the density of shaft material is 7 830.45 kg/m^3 what is the percentage increase in power/weight ratio affected by this modification (10-mark)?

Third question (20-mark)

A parabolic segment has a curve equation of $y = k x^3$, its base length is a = 40 cm, and its height length is b = 54 cm, compute (a) The entire area of the parabolic segment (5-mark). (b) Locate the centroid with respect to x and y-axes (10-mark). (c) The moment of inertia with respect to x and y-axes (3-mark). And (d) The redius of gyration (2-mark).

Fourth question (20-mark)

Compute the total internal shear force V and the internal resisting moment M at each of two sections, respectively, 3 and 8 m from the left end of the overhanging beam shown in the following figure.



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