KERALA AGRICULTURAL UNIVERSITY

B.Tech (Agrl.Engg) 2014 Admission

II[nd] Semester Final Examination-June/July -2015

Cat. No: Iden.1203 **Marks: 50.00**

Title: Strength of Materials (2+1) **Time: 2 hours**

I Fill up the blanks **(10 x 1=10)**

1. Change in length per unit length is called _____
2. The resistance per unit area to deformation is called _____
3. The maximum strain energy stored at elastic limit per unit volume is called _____
4. The load required to produce a unit deflection in a spring is called _____
5. A structural member ,subjected to an axial compressive force ,is called as_____

Write true or False

6. 1 N/m^2 is equal to 1 Pascal
7. A beam of uniform strength is one in which the stiffness is same at every section
8. At the point of contraflexure ,the bending moment is zero
9. For short column ,slenderness ratio should be greater than 80
10. Macaulay's methods is used to determine the deflection of beams

II Write short notes on any FIVE questions **(5 x 2=10)**

1. Differentiate between Fixed beam and simply supported beam
2. Define Hooke's law and Modulus of elasticity
3. Distinguish between thin cylinder and thick cylinder
4. Differentiate between circumferential stress and longitudinal stress
5. Distinguish between column and strut
6. Mohr's theorem and it's use
7. SFD of a simply supported beam with central point load

III Write short essays on any FIVE questions **(5 x 4=20)**

1. Derive the relationship between Bulk modulus ,Young's modulus and Poisson's ratio
2. A 2 m long cantilever is loaded with a point load of 500 N at the free end .If the section is rectangular 80 mm(wide) x 160 mm(deep) .and E= 10 GN/m^2.calculate the slope and deflection at the free end of the cantilever
3. Derive the following relationship

   $M/I=f/y=E/R$ where

   M=Bending moment. I= Moment of Inertia. E=Young's modulus. R= Radius of curvature f= Bending stress in the fiber, at a distance y from the neutral axis

4. An I section ,with rectangular ends, has the following dimensions;

   flanges -150 mm x 20 mm web-300mm x10 mm

   Find the maximum shearing stress developed in the beam for a shearing force of 50kN

5. A steel shaft 8 cm diameter and 800 cm in length is to transmit certain twisting moment such that angle of twist is not to exceed 2.1^0.Determine the value of the twisting moment and maximum shear stress. Given N =0.8 x 10^4 kN/cm^2

6. Calculate the minimum wall thickness of a thin cylinder 1 m in diameter ,if it is to withstand an internal pressure of 200 N/cm^2 and the longitudinal and hoop stress not to exceed 3000 N/cm^2 and 4000 N/cm^2 respectively

7. A steel rod 5 cm long and of 4 cm diameter is used as a column, with one end fixed and the other free. Determine the crippling load using Euler's formula .Take E as 20 GN/m^2

IV Write an essay on any ONE **(1 x 10=10)**

1. A cube of 60mm side is subjected to a force of 5 kN (Tension) .7 kN (Compressive) and 4 kN (Tension) along x,y and Z directions respectively .Determine the stresses and strains in x,y and z directions .Also find the change in volume of the block. Take E as 200 GPa and poissson's ratio as (3/10)

2. A fixed beam AB of span 6 metres carriers point loads 20 t and 15 t at distances 2 m and 4 m from the left end A. Find the fixed end moments and the reactions at the supports. Draw BM and SF diagrams

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