KERALA AGRICULTURAL UNIVERSITY

B.Tech (Agrl.Engg) Degree programme 2015 Admission
II[nd] Semester Final Examination- June/July-2016

Cat. No: Iden.1203 **Marks: 50**
Title: Strength of Materials (2+1) **Time: 2 hours**

I. Fill up the blanks / True or False **10 x 1 = 10**

Fill up the blanks

1. The slenderness ratio of a long column is above _____
2. A vertical strut used in buildings or frames is called _____
3. The value of Poisson's ratio for steel varies from _____ to _____
4. Maximum deflection of cantilever with a span of 'l', subjected to a uniformly distributed load of 'W' is equal to _____
5. The load at which the column just buckles is called _____
6. When a section is subjected to two equal and opposite pulls and the body tend to increase in length, the stress induced is called _____ stress
7. Fixing moment over a simply supported beam is _____
8. When a solid shaft is subjected to torsion, the shear stress induced in the shaft at its centre is _____

True or False

9. The maximum slope of a cantilever carrying a point load at its free end is at the free end
10. With the help of conjugate beam method, one can find the slope in case of cantilever and simply supported beams.

II. Write short answers on ANY FIVE **5 x 2 = 10**

1. An alloy wire of 2 mm^2 cross sectional area and 12N weight hangs freely under its own weight. Find the maximum length of the wire, if its extension is not to exceed 0.6 mm. Take E for the wire as 150 GPa.
2. What is the principle of superposition? Explain its uses
3. If the values of modulus of elasticity and poisson's ratio for an alloy body is 150 GPa and 0.25 respectively, determine the value of bulk modulus for the alloy.
4. State the assumptions in the theory of simple bending
5. Derive the relation between modulus of elasticity and modulus of rigidity
6. Differentiate uniformly distributed load and uniformly varying load
7. What are the uses of moment area method in finding out the slope and deflection of beams?

III. Write short essays on ANY FIVE of the following **5 x 4 =20**

1. A simply supported beam of 3 m span carries two loads of 5 kN each at 1 m and 2 m from the left hand support. Draw the shear force and bending moment diagrams for the beam.
2. In an experiment, a bar of 30 mm diameter is subjected to a pull of 60 kN. The measured extension on gauge length of 200 mm is 0.09 mm and the change in diameter is 0.0039 mm. Calculate the Poisson's ratio and Young's modulus of elasticity
3. Derive a relation for strain energy stored in a body, when the load is applied with impact
4. A hollow shaft is to transmit 200 kW at 80 rpm. If the shear stress is not to exceed 60 MPa and internal diameter is 0.6 of the external diameter, find the diameters of the shaft.
5. A mild steel column of 50 mm diameter is hinged at both of its ends. Find the crippling load for the column, if its length is 2.5m. Take E for the column material as 200 GPa.
6. Derive the torsional equation for a circular shaft.

7. A thin cylindrical shell of 400 mm diameter is to be designed for an internal pressure of 2.4 MPa. Find the suitable thickness of the shell, if the allowable circumferential stress is 50 MPa.

IV. Answer any ONE of the following 1x 10 = 10

1. Derive a relation for the Euler's crippling load for a column when it has both ends fixed.
2. Derive a relation for the volumetric strain of a body