

# KERALA AGRICULTURAL UNIVERSITY

B.Tech.Food Engg. 2013 Admission

One Time Re-examination- IV<sup>th</sup> Semester January 2017

Cat. No: Cien 2204

Marks: 50

Title: Mechanics and Strength of Materials (2+1)

Time : 2 hours

## I. Fill up the blanks/Define:

(10 x 1=10)

1. A redundant frame is also called ----- frame.
2. The ratio of change in volume to original volume is known as -----
3. The point where the bending moment changes sign is called as -----
4. The ratio of equivalent length of the column to the minimum radius of gyration is called -----
5. The relation between equivalent length (L) and actual length (I) of a column for both ends fixed is -----
6. The bending moment at the free end of a cantilever beam carrying any type of load is -----
7. The shear stress at any section of a shaft is maximum at ----- of the surface .
8. A vertical strut used in buildings or frames, is called a -----
9. Lateral strain is otherwise called as -----
10. Define Poisson's ratio.

## II. Write short notes on ANY FIVE:

(5 x 2=10)

1. Distinguish between shear force and bending moment.
2. Distinguish overhanging beam and continuous beam.
3. What is meant by eccentric loading.
4. Define uniformly varying load.
5. Explain various types of equilibriums.
6. Define the term moment of inertia.
7. Derive the relation of power transmitted by a shaft

## III Write answers on ANY FIVE:

(5 x 4=20)

1. For a given material, Young's modulus is  $110 \text{ GN/mm}^2$  and shear modulus is  $42 \text{ GN/mm}^2$ . Find the bulk modulus and lateral contraction of a round bar of 37.5 mm diameter and 2.4 m long when stretched 2.5 mm.
2. A rectangular beam 60 mm wide and 150 mm deep is simply supported over a span of 6 meters. If the beam is subjected to central point load of 12 kN, find the maximum bending stress induced in the beam section.
3. A cantilever AB 1.8 m long carries a point load of 2.5 kN at its free end and a uniformly distributed load of 1kN/m from A to B. Draw the shear force and bending moment diagrams for the beam.
4. A circular shaft of 80 mm diameter is required to transmit power at 120 rpm. If the shear stress is not to exceed 40 Mpa, find the power transmitted by 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. 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 the values of Young's modulus and bulk modulus.
7. Discuss in detail about D' Alembert's principle.

**IV. Write essay on any ONE**

**(1 x 10=10)**

1. Derive the equation for finding out the volumetric strain of a rectangular body subjected to an axial force.
2. Describe in detail about the Mohr's circle method.

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