KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food.Engg) Degree Programme 2014 Admission
IVth Semester Final Examination- June-July -2016

Cat. No: Cien.2204 **Marks: 50**
Title: Mechanics and strength of Materials (2+1) **Time: 2 hours**

Part – I Answer all the questions (10 x 1 =10)

1. A framed structure of a triangular shape is ____ frame
2. The ratio of direct stress and _____ is bulk modulus
3. The load at which the column just buckles is called _____
4. The relation between equivalent length (L) and actual length (l) of a column for both ends hinged is _____
5. The shape of the bending moment diagram over the length of a beam, carrying a uniformly distributed load is always _____
6. Define strain
7. When a section is subjected to two equal and opposite pulls, as a result of which the body tends to lengthen, the stress induced is called _____
8. Composite bars contain more than _____ bars
9. The bending moment on a section is maximum where shear force is _____
10. When a section is subjected to two equal and opposite forces, acting tangentially across the resisting section, as a result of which the body tends to shear off across the section, the stress induced is called _____

Part – II Write short notes on any FIVE of the following (5 x 2 =10)

1. Distinguish between bending stress and shearing stress
2. Define thermal stress and strain
3. Define uniformly distributed load
4. State the assumptions made in Euler's column theory
5. Derive the relation between modulus of elasticity and modulus of rigidity
6. Define centre of gravity
7. What is a spring? Explain its uses.

Part – III Write any FIVE of the following (5 x 2 =10)

1. Find the Euler's crippling load for a hollow cylindrical steel column of 38 mm external diameter and 2.5 mm thick. Take length of the column as 2.3 m and hinged at its both ends. Take E as 205 GPa. Also determine crippling load by Rankine's formula using constants as 335 MPa and 1/7500.
2. 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.
3. Derive the torsional equation for a circular shaft.
4. 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.
5. A circular bar rigidly fixed at its both ends uniformly tapers from 75 mm at one end to 50 mm at the other end. If its temperature is raised through 26 k, what will be the maximum

stress developed in the bar. Take E as 200 GPa and α as 12 x 10-6 /K for the bar material

6. Derive an expression for shear stress at any point in the cross section of a beam
7. Find the moment of inertia of a T section with flange as 150 mm x 50 mm and web as 150 mm x 50 mm about XX and YY axes through the centre of gravity of the section ,

Part – IV Answer any ONE of the following **(10 x 1 =10)**

1. Derive the relation $\frac{M}{I}=\frac{\sigma}{y}=\frac{E}{R}$
2. Derive a relation for the Euler's crippling load for a column when it has both ends hinged