KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Agri. Engg) 2020 Admission
II Semester Final Examination- October 2021

Iden.1203   **Strength of Materials (1+1)**

Marks: 50
Time: 2 hours
(10x1=10)

I   **Answer the following**
1.   A beam which is supported by intermediate supports also is a _____beam.
2.   The simply supported beam with a central point load has the deflection equation as $y_c =$___
     Choose the appropriate answer
3.   When the temperature of a body is increased, the stress induced will be
     a)   tension   b)   compression
     c)   both 'a' and 'b'   d)   neither 'a' not 'b'

4.   If a material has identical properties in all directions, it is said to be
     a) Homogenous   b) Isotropic
     c) Elastic   d) Orthotropic
5.   The roller support in a given beam is taken in conjugate beam as
     a) Fixed   b) Roller support
     c) Rocker support   d) Hinge
6.   Moment area method is useful in determining the following in a beam.
     a) Slope and deflection at a point. b) Tensile and compressive stresses at a point
     c) S.F and B.M at a point   d) None of the above.
7.   Clapeyron's theorem is also known as the theory of
     a) 3- moments   b) 2-moments
     c) Single moment   d) No moment
8.   Which of the following methods is not a compression member
     a) Boom   b) Strut
     c) Stanchion   d) None of the above
9.   The slenderness ratio of a long column is
     a)   10 - 20   b)   20 - 30
     c)   50 - 60   d)   Above 80
10. Polar moment of Inertia of a solid shaft of diameter (D) is

     a) $\frac{\pi}{16} \times D^3$ b) $\frac{\pi}{16} \times D^4$

     c) $\frac{\pi}{32} \times D^3$ d) $\frac{\pi}{32} \times D^4$

II   **Write short notes on ANY FIVE of the following**   **(5x2=10)**
1.   Define a column.
2.   What is meant by Crippling load of a long column?
3.   Axis of reference.
4.   Modulus of rigidity.

5. State the equation for slope and deflection of a cantilever beam loaded with a point load at its free end
6. Middle third rule.
7. Eccentricity.

III   **Answer ANY FIVE of the following.**

1. A continuous beam PQRS having PQ = 3.0 m, QR = 4.0 m and RS = 2.0 m. Supports P & S are simply supported. Span PQ, QR and RS carries U.D.L of 20 kN/m, 12 kN/m and 30 kN/m respectively. Determine the support moments and draw B.M respectively. Use theorem of three moments.
2. A cantilever beam of span 3 m is subjected to a point load of 4 kN at free end and u.d.l of 10 kN/m over entire span. Calculate slope and deflection at free end of the beam. Take $EI = 2.4 \times 10^{12}$ N.mm^2.
3. Derive the equation for the buckling Load of Columns with Both Ends Hinged
4. State the assumptions made in Euler's column theory.
5. Derive an expression for finding out the deflection of simply supported beam with a point load at mid-point.
6. Derive the equation for the buckling Load of Columns with one end hinged and other end free
7. A fixed beam of 6 m span carries u.D.l of 80 kN/m over its entire span. Draw S.F and B.M diagram for the beam. Also find point of contraflexure.

IV   **Write an essay on ANY ONE of the following**

1. Derive the relationship between slope, deflection and radius of curvature of a bent up beam
2. A horizontal steel girder having uniform cross section is 14 m long and is simply supported at its ends. It carries two concentrated loads as shown in figure 1. Calculate the deflections of the beam under the loads C and D. E = 200 GPa and $I = 160 \times 10^6$ mm^4. Solve by Macaulay's method.
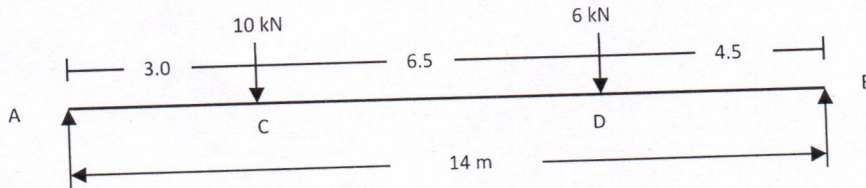

Figure 1

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