KERALA AGRICULTURAL UNIVERSITY
B.Tech. (Agrl. Engg.) 2022 & Previous Admissions
II Semester Final Examination - September 2023

Iden.1203   **Strength of Materials (1+1)**   **Marks: 50**
Time: 2 hours

I   **Fill in the Blanks**   **(10x1=10)**

1.   .... is a horizontal structural member subjected to transverse loads perpendicular to its axis.

2.   The diagram depicts .... kind of beam.

3.   Moving train is an example of .... load.
      State True or False

4.   Column is a tension member.
      Answer the following

5.   Define Radius of Gyration.

6.   What is statically determinate structure?

7.   What is flexural rigidity?

8.   Define eccentricity.

9.   What do you mean by axial load?

10.   Define slope.

II   **Write short notes on ANY FIVE of the following**   **(5x2=10)**

1.   Give factors affecting slope and deflection.

2.   Differentiate between long column and short column.

3.   State advantages and disadvantages of fixed beam.

4.   Discuss any two factors affecting stiffness of beam.

5.   Explain indeterminate structure with examples.

6.   The external and internal diameters of a hollow cast iron column are 200 mm and 150 mm respectively. Determine radius of gyration.

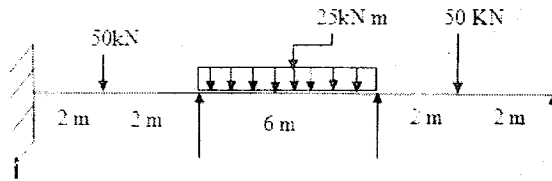7.   Differentiate between simply supported beam and fixed beam.

III   **Answer ANY FIVE of the following**   **(5x4=20)**

1.   A fixed beam of span 6.5 m carries two points loads 25 kN each at 1.5 m distance from both supports. Draw shear force and bending moment diagram for the beam.

2.   A cantilever beam 2.0 m long is subjected to an u.d.l of 2.5 kN/m over 1.25 m length from fixed end. The cross section of beam is 120 mm × 240 mm and $E = 10 \times 10^3$ N/mm^2. Find the slope and deflection of free end.

3.   A circular section carries an eccentric load of 100 kN with eccentricity of 20 mm. Find the diameter of section if maximum and minimum resultant stress are not to exceed 10 N/mm^2 in compression and ..0 N/mm^2 in tension respectively.

4.   A 2.5 m long pin ended column of square section is made up of timber. Using Euler's formula, find out size of the column with a factor of safety 2 for 250 kN axial loads. Consider E = 12.5 GPa, allowable stress in axial compression = 12 MPa.

5.   A two span continuous beam ABC is simply supported at A,B,C such that AB = 4m and BC = 6 m. The span AB carries a central point load of 140 kN and span BC carries an U.D.L of 30 kN/m. Draw S.F and B.M diagrams for the beam.

6. A rectangular column section ABCD having side AB = CD = 400 mm and BC = AD = 300 mm carries a compressive load of 300 kN at corner B. Find stress at each corner A,B,C and D and draw stress distribution diagram for each side.

7. A rectangular dam is 7.2 m high retain water up to 6 m on its one side. The density of wall material and water is 23.5 kN/m^3 and 10 kN/m^3 respectively. Find minimum base width required to avoid tension at base.

IV   **Write an essay on ANY ONE of the following**   **(1x10=10)**

1. (a) Derive Euler's formula for both ends of the column are fixed.
   OR
   (a) Draw 'core' for the following sections:
       (i) Rectangular section.
       (ii) Hollow circular section.
   (b) A masonry dam 6 m high, 3 m wide at base and 1.2 m wide at top, retains water on vertical face for full height. Considering density of masonry as 17 kN/m3 and density of water as 10 kN/m3, find out maximum and minimum pressure intensities at the base.

2. Draw B.M diagram for the given beam using moment distribution method. Take EI = constant.

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