KERALA AGRICULTURAL UNIVERSITY
B. Tech. (Agrl. Engg.)
II Semester Final Re - Examination – August 2025
2023 & Previous Admissions

Iden.1203

Strength of Materials (1+1)

Marks: 50
Time: 2 hours

I **State True or False** **(10x1=10)**

1. A continuous beam has more than two supports.
2. In a long column with one end fixed and the other free, if the slenderness ration increases, the critical stress decreases.
3. The side of the dam to which the water from the river or stream approaches is called downstream and the other side is called upstream.
4. Three – moment theorem for continuous beam was forwarded by Maxwell.
5. The stress in a beam is less if its section modulus is high.

Fill in the blanks

6. The designing of a beam based on bending and shear stress consideration is known as .....criterion.
7. The ratio of stress and strain is known as .....
8. Neutral axis in a beam carries .....bending stress.
9. If the load on a column is increased to a value that on its removal the deflection remains, the load is called .....
10. Moment area method is used to determine the .....

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

1. Explain the term fixed beam.
2. Explain the term gravity dam with an example.
3. Write short note on columns, struts, buckling factor and safe load.
4. Which method is used to determine the slope and deflection at a point? What are its advantages?
5. What is a continuous or propped beam? Why is it not possible to analyze these by equations of static equilibrium?
6. What is meant by crippling load?
7. State the assumptions made in Euler's theory of long columns.

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

1. A 3.2m long fixed-end hollow cast iron column has its internal and external diameters as 60mm and 80mm respectively. Determine the Rankine's crippling load using the value of crushing stress to be 500MPa and the value of Rankine's constant as 1/1600.

2. What would be the slope and deflection at point "B" as in Figure-1 if the applied moment is 100KNm and length is 3m. The section of the beam is 15 cm high and 10 cm wide and $E= 2.1 \times 10^7$ N/cm^2 for the material used.

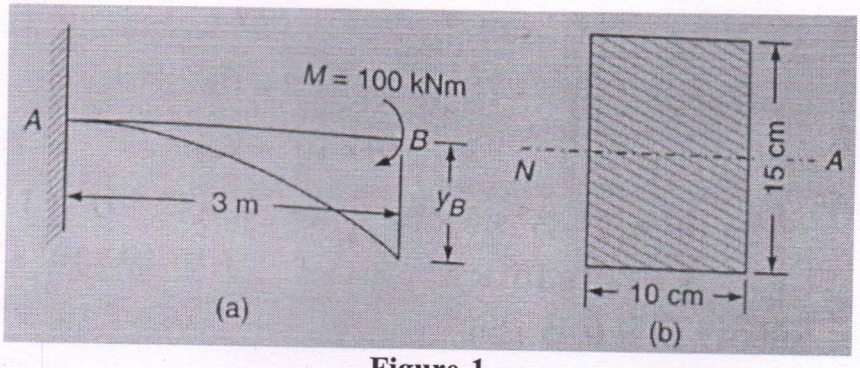

Figure-1

3. Derive the relation for the Euler's Crippling load for a column when one end is fixed and the other end is hinged.
4. A cantilever of length "l" has a point load "W" at the free end. Determine the slope and deflection at the free end using conjugate beam method.
5. Compute the reaction at the end "C" of the propped cantilever as shown in Figure-2:

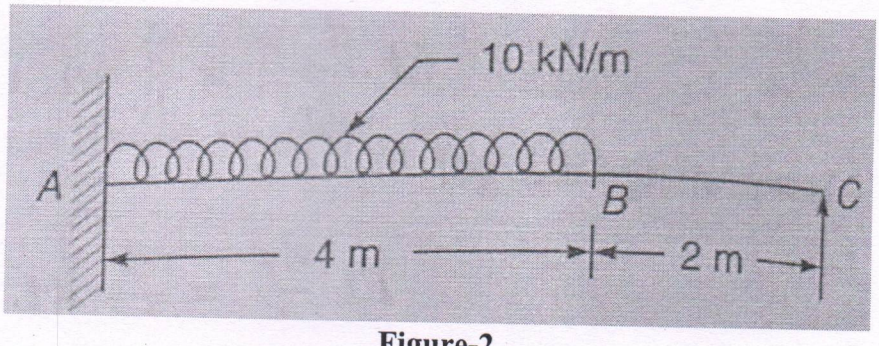

Figure-2

6. Derive the expression for slope at supports and deflection at the centre of a simply supported beam with uniformly distributed load for the whole span using double integration method.
7. A retaining wall 6m high and 2.5m wide retains water up to its top. Find the total pressure per meter length of the wall and the point at which the resultant cuts the base. Also find the resultant thrust on the base of the wall per meter length. Assume weight of masonry as 23 KN/m^3.

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

1. Demonstrate the application of Macaulay's method to determine slope and deflection of a simply supported beam carrying an eccentric point load. Assume applicable data suitably.
2. Explain the conditions for the stability of a Dam. A rectangular masonry dam is 2 m at the base. If it retains water up to full height, what is the maximum height when there is no tension to occur to base? If factor of safety against sliding is 1.5, is the dam safe against sliding? Density of masonry is 2.5 times the density of water and the coefficient of friction is 0.5.

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