KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Agri. Engg) 2017 Admission
II Semester Final Examination- July 2018

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

Marks: 50
Time:2hours

I A Choose the appropriate answer **(10x1=10)**

1 For a simply supported beam of span 4m carrying point load at mid span, the slope at the mid span is

a. 4 b. 8 c. 2 d. Zero

2 When a structural member of uniform section is subjected to a moment at one end only, then the moment required so as to rotate that end to produce unit slope, is called as

a. Strength b. Eccentricity c. Stiffness d. Rigidity

3 At the point of contra flexure, shear force is ..... and bending moment is

a. both zero b. max, min c. min, max d. both are increasing

4 In order tension may not be produced at the section of a dam, the eccentricity e

a. $e = \left(\frac{b}{3}\right)$ b. $e < \left(\frac{b}{6}\right)$ c. $e > \left(\frac{b}{6}\right)$ d. $e = b$

5 The relative stiffness of a member at a joint, whose far end is fixed is

a. $\frac{1}{2}\left(\frac{I}{l}\right)$ b. $\frac{3}{4}\left(\frac{I}{l}\right)$ c. $\left(\frac{I}{l}\right)$ d. $\left(\frac{l}{I}\right)$

B Match the following

6	Long steel column	a.	Slenderness ratio < 50
7	Fixed end	b.	S.F exists and BM is zero
8	Roller support	c.	S.F and BM are zero
9	Short steel column	d.	S.F and B.M exists
10	Free end	e.	Slenderness ratio >200

II Write Short notes on any FIVE of the following **(5x2=10)**

1 Macaulay's method for finding out the slope and deflection of a beam.
2 Limitations of Euler's theory of long columns.
3 Flexural rigidity
4 Moment-area method. Illustrate Mohr's theorems.
5 Enumerate the scheme of classification of columns and struts.
6 Clapeyron's theorem of three moments.
7 Statically indeterminate beams.

P.T.O

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

1 A cantilever of length **l** carries a uniformly distributed load of **w** per unit run over the whole length. Calculate the slope and deflection at the free end for the conjugate beam.

2 A cantilever of **2m** length carries a uniformly distributed load of **150 kg/m** for a length of **1.25 m** from the fixed end and a point load of **100 kg** at the free end. If the section B is rectangular **12 cm** wide and **24 cm** depth, find the deflection at the free end.

3 Derive the relation for the Euler's Crippling load for a column when both the ends are fixed.

4 A continuous beam ABC consists of two span AB and BC of lengths **6 m** and **8 m**. The AB span carries a point load of **12 t** at **4 m** from A, while the span BC carries a point load of **16 t** at **5 m** from C. Find the moments and reactions at the supports.

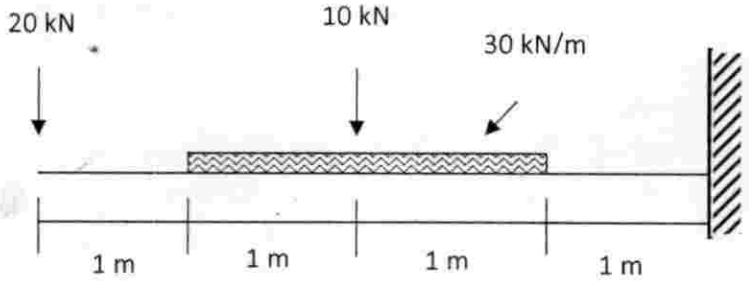
5 A dam section **8m** high with **7.5 m** of water impounded have a top width of **1m**. The weight of masonry structure is **2240 kg/m^3**. Find the minimum bottom width required. Consider that the coefficient of friction = **0.6** and the water face of the dam is vertical.

6 A **2 m** long pin ended column of square cross section is to be made of wood. Determine the size of the column to support the following loads safely. **a) 95 kN, b) 200 kN**, use factor of safety of **0.3** and Euler's crippling load for buckling. Assume **E=12 GPa** and allowable stress being limited to **12 MPa**.

7 A short column of external diameter **D** and internal diameter d carries an eccentric load **W**. Find the greatest eccentricity which the load can have without producing tension on the cross section of the column.

IV **Answer any ONE of the following** **(1x10=10)**

1 Plot the elastic curve and find the maximum deflection and slope for the cantilever beam loaded as shown in figure. Take **E = 200 kN/mm^2** and **I= 300x106 mm^4**.



2 A simply supported beam of **10 m** is loaded by two concentrated loads of **10 t** and **6 t** at a distance of **2m** and **5 m** respectively from the left end. Calculate the deflection under each load. Find also the maximum deflection. Take **I = 18 x 10^4 cm^4** and **E = 2x10^4 kg/cm^2**.

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