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B.TECH. CIVIL ENGINEERING

Term-End Examination

December, 2012

BICE-008 : STRUCTURAL ANALYSIS-I

Time : 3 hours

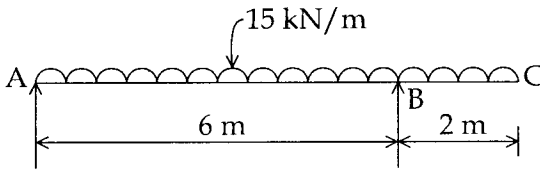
Maximum Marks : 70

Note : Attempt any seven question.

Assume suitable data if any.

1. (a) Define Hooke's law and Poisson's ratio. 3
- (b) A hollow steel column has an external diameter of 250 mm and an internal diameter of 200 mm. Find the safe axial compressive load for the column if the safe compressive stress is 120 N/mm^2 . 7
2. (a) Explain salient features of Bending moment and shear force diagrams. 4
- (b) A rectangular beam 100 mm wide is subjected to a maximum shear force of 50,000 N the corresponding maximum shearing stress being 3 N/mm^2 . Find the depth of the beam. 6

3. A Simply supported beam ABC with supports at A and B, 6 metres apart and with an over hanging BC 2 metres long carries a uniformly distributed load of 15 kN per metre over the whole length as shown in figure below. Draw S.F. and B.M. diagrams : 10



4. (a) State and explain, RO middle third rule. 3
- (b) Find the minimum value of the slenderness ratio of a mild steel column for which Euler's formula is valid Take $f_c = 330 \text{ N/mm}^2$ and $E = 2.1 \times 10^5 \text{ N/mm}^2$. 7
5. A hollow circular column 2 metre long has one of its end fixed and the other end free and has to support an axial load of 500 kN. The internal diameter is 0.8 times the external diameter. Allowing a factor of safety of 4, calculate the external dia and the thickness of metal. Use a Ran Kinels formula. Take 10

$$f_t = 330 \text{ N/mm}^2 \text{ and } \alpha = \frac{1}{7500}.$$

6. The line of thrust in a compression testing specimen 14.32 mm diameter is parallel to the axis of the specimen but is displaced from it. Calculate the distance of the line of thrust from the axis when the maximum stress is 15% greater than the mean stress on a normal section. 10
7. A solid shaft 125 mm in diameter transmits 120 KW at 160 rpm. Find the maximum shear stress included in the shaft. Find also the angle of twist in a length of 7.5 m. Take $C = 8 \times 10^4 \text{ N/mm}^2$. 10
8. (a) Differentiate between impact and fatigue testing method. 5×2=10
(b) Discuss the assumptions in the material properties of steel.
9. Explain the different end conditions of columns. Also compare the effective lengths of different end conditions. 10
10. Write short notes on *any two* : 10
(a) Mohr's circle and Hoopstresses.
(b) Application of numerical methods in columns and struts.
(c) Standard tests and non-destructive testing on concrete.