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BICE-008

00364

B.TECH. CIVIL ENGINEERING

Term-End Examination

June, 2014

BICE-008 : STRUCTURAL ANALYSIS-I

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any seven** questions. Use of scientific calculator is **permitted**. Assume **any** missing data suitably.*

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1. A vertical rod tapers uniformly from a diameter of 65 mm at top to 35 mm at the bottom. It is rigidly fixed at the upper end and is subjected to an axial load of 25 kN. If its length is 2.5 m. Determine the total extension in the rod. Take $E = 2 \times 10^5$ MPa. **10**

2. (a) Explain the different types of elastic constants. **4**

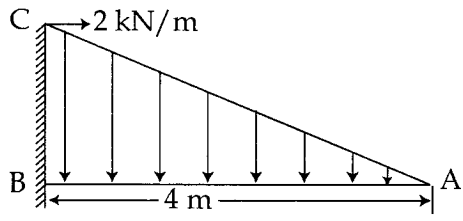
(b) Explain the Mohr's circle. **6**

3. (a) What are the assumptions made in simple theory of bending ? **5**

(b) Derive the equation of simple bending **5**

$$\frac{M}{I} = \frac{f_b}{y} = \frac{E}{R}$$

4. Draw S.F. and B.M. diagrams of cantilever shown below : **10**



5. (a) What is the middle third rule ? **4**
   (b) Define Hook's law, Modulus of rigidity and Poission's ratio and explain the stress-strain relationship curve of Mild steel. **6**

6. (a) What is difference between column and strut ? **4**
   (b) Explain the Eulers theory of buckling for different end conditions. **6**

7. What must be the length of a 5 mm diameter aluminium wire so that it can be twisted through one complete revolution without exceeding shearing stress of 42 MN/m^2 ? Take modulus of rigidity $C = 27\ GN/m^2$. **10**

8. (a) Define unsymmetrical bending. **3**
   (b) Derive the relationship between torsional moment, twist and shear stress for a uniform shaft. **7**

9. Write short notes on **any two** of the followings : **5x2=10**
   (a) Fatigue strength
   (b) Non destructive testing
   (c) Residual stresses