2014

STRUCTURE III

Paper : 3.5

Full Marks : 100

Time : 3 Hours

The figures in the margin indicate full marks for the questions.

Answer any five questions.

1. Write short notes on following : 5×4
   i) Failure of column or street
   ii) Rankine's formula for columns
   iii) Moment Area Method
   iv) Macaulay's Method
2. Derive the equation for slope and deflection of a cantilever beam having uniformly distributed load. 20
3. Derive the equation for critical load for column having both ends fixed. 20
4. Explain the following :
   a) Double Integration Method for Slope and Deflection 5
   b) Macaulay's Method for Slope and Deflection. 5
   c) Euler's Column Theory 10
5. Derive the equation for slope and deflection of a simply supported beam with central point load either by Double Integration Method or Macaulay's method. 20
6. a) A wooden beam 200 mm wide and 300mm deep has a span of 4m. Determine the load that can be placed at its centre to cause the beam a deflection of 10mm. Take Modulus of Elasticity as 10 GPa. 10
   b) A simply supported beam of span 4m is carrying a uniformly distributed load of 2KN/m over the entire span. Find the maximum slope and deflection of the beam. Take flexure rigidity of the beam as 30×10^9 N mm^2 10

P.T.O.

7. a) A cantilever beam 160mm width and 240mm depth is 1.75 m long. What load can be placed at its free end of the cantilever, if its deflection under load is not to exceed 4.5mm. Take Modulus of Elasticity of the beam as 250000 N/mm^2 10

   b) A cantilever beam 3m long carries a point load of 20KN at a distance of 2m from the fixed end. Determine the slope and deflection at the free end of the cantilever. Take Flexural Rigidity of the beam = $8\times10^{12}Nmm^2$ 10

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