Total No. of printed pages = 5

43 (2) STRU - II 2·5

2013

STRUCTURE - II

Paper : ENG-2·5

Full Marks – 100

Pass Marks – 40

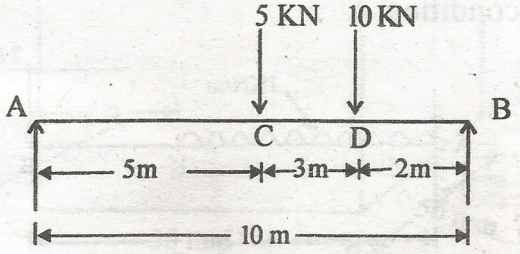
Time – Three hours

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

Answer any *five* question.

1. (a) Define Hooke's law.
Derive an expression for deformation of a body due to force acting on it. 5+5=10

(b) Draw the shear force diagram and the bending moment diagram for the following loading condition. 10



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2. (a) Define primary and secondary strain.

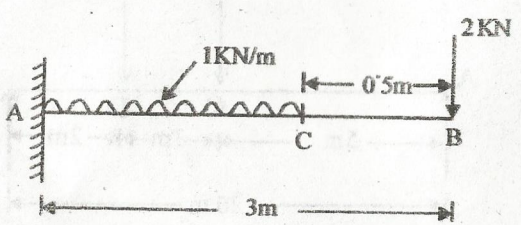
A metal bar 50 mm × 50 mm in section is subjected to an axial compressive load of 500 KN. If the contraction of a 200 mm gauge length was found to be 0·5 mm and the increase in thickness 0·04 mm, find the values of Young's modulus and Poisson's ratio for the bar material. 3+7=10

(b) For a given material, Young's modulus is 120 GPa and modulus of rigidity is 40 GPa. Find the bulk modulus and lateral construction of a round bar of 50 mm diameter and 2·5m long, when stretched 2·5 mm. Take Poisson's ratio as 0·25. 10

3. (a) Define volumetric strain. 3+7=10

A steel bar 50 mm × 50 mm in cross-section is 1·2m long. It is subjected to an axial pull of 200 KN. What are the changes in length, width and volume of the bar, if the value of Poisson's ratio is 0·3 ? Take E as 200 GPa.

(b) Draw S. F. D and B. M. D for the given load condition. 10

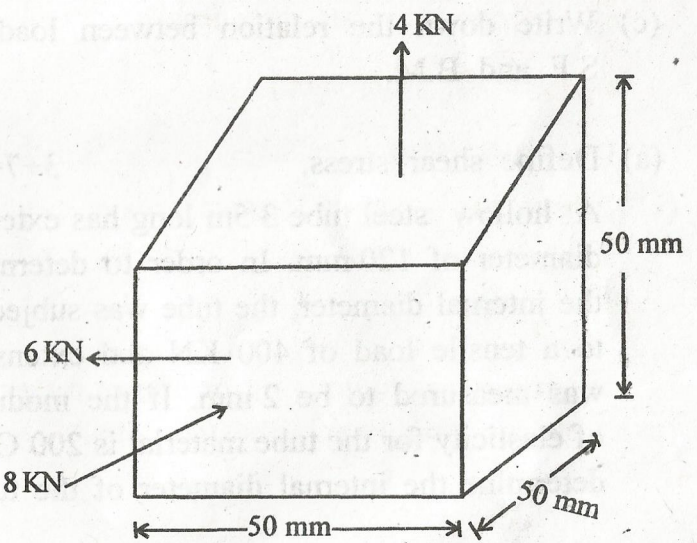


4. (a) Define Bulk Modulus.

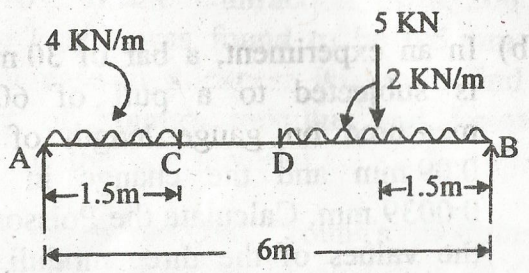
Write down different types of beams and different types of loading. 3+7=10

(b) In an experiment, a bar of 30 mm diameter is subjected to a pull of 60 KN. The measured on gauge length of 200 mm is 0·09 mm and the change in diameter is 0·0039 mm. Calculate the Poisson's ratio and the values of the three moduli. 10

5. (a) A steel cube block of 50 mm side is subjected to a force of 6 KN (Tension), 8 KN (Compression) and 4 KN (Tension) along x, y and z direction respectively. Determine the change in volume of the block. Take E as 200 GPa and m as 10/3. 10



(b) Draw the S.F.D and B.M.D for the given load condition below : 10



6. (a) Define shear force and bending moment. 10

(b) Write down the sign conventions for solving shear force and bending moment. 5

(c) Write down the relation between loading, S.F and B.M. 5

7. (a) Define shear stress. 3+7=10

A hollow steel tube 3·5m long has external diameter of 120 mm. In order to determine the internal diameter, the tube was subjected to a tensile load of 400 KN and extension was measured to be 2 mm. If the modulus of elasticity for the tube material is 200 GPa, determine the internal diameter of the tube.

(b) Draw the S.F.D and B.M.D for the given load condition : 10