43 (2) STRU-II

2014

STRUCTURE II

Paper : ENG-2·5

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

1. *(a)* Define Stress and Strain. 4×5=20

   (b) What are the types of Stress and Strain ?

   (c) Define Hooke's law with appropriate graph.

   (d) Write down the sign convention of shear Stress and Strain.

   (e) What is Poisson's ratio ?

2. *(a)* Draw graphs of Stress Strain Relationship for the following : 2×5=10

(i) Linear electric material

(ii) Rigid material

(iii) Perfectly plastic

(iv) Rigid plastic

(v) Elastic perfectly plastic.

(b) Write down the relations between following elastic constants

(i) Bulk modulus, Young's modulus and shear modulus 5×2=10

(ii) Bulk modulus, Young's modulus and Poisson's ratio.

3. *(a)* Explain the sign convention for shear force and bending moment. 5

(b) Explain the relation between loading, shear force and bending moment. 5

(c) Draw SFD and BMD for a cantilever beam of span $4 \cdot 5m$ carrying a point load of $3kN$ at the free end and other point of $2kN$ at a distance of $2m$ from the free end. 10

4. *(a)* Draw SFD and BMD for a cantilever beam of span $2m$ carrying a *udl* of $1 \cdot 5$ *kN/m* over a length of $1 \cdot 6$ from the free end. 10

(b) Derive an equation for bending moment and shear force for a cantilever beam carrying *udl.* 10

5. *(a)* Draw SFD and BMD for a cantilever beam $4m$ long carrying a uniformly varying load zero at the free end to $3kN/m$ at the fixed end. 10

(b) Draw the SFD and BMD for a simply supported beam of span $2 \cdot 5m$ carrying a point *udl* of $2kN$ at a distance $1m$ from one end and another point load of $4kN$ at a distance of $1m$ from the other end. 10

6. *(a)* What are the assumptions in the Theory of Simple Bending ? 10

(b) Derive an equation for bending stress in a beam. 10

7. *(a)* What is Flitched beam ? 5

(b) A wooden beam of 100*m* wide and 250*mm* deep and 3*m* long is carrying a *udl* of 400 *N/m,* determine the maximum shear stress and sketch the variation of shear stress along the depth of the beam. 15