Total No. of printed pages = 3

CT-303/SOM/3rd Sem/2014/N

STRENGTH OF MATERIALS

Full Marks – 70

Pass Marks – 28

Time – Three hours

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

Answer any *five* questions.

1. (a) Derive the equation for deformation of a body due to a force acting on it. 4

   (b) Discuss principle of superposition. 2

   (c) A brass bar having cross-sectional area of 500 mm^2 is subjected to axial forces as shown in Fig. 1. Find the elongation of the bar. Take E = 80 GPa. 8

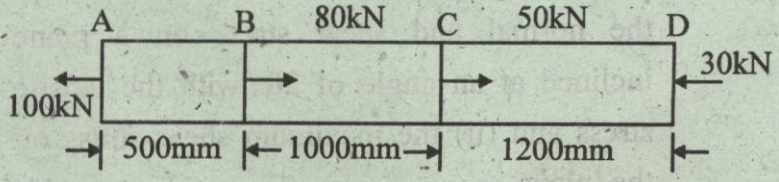

Fig. 1

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2. (a) Discuss and explain that every linear strain is accompanied by an opposite kind of strain in every direction at right angles to it. 12

(b) What is a Poisson's ratio ? 2

3. In an experiment, a bar of 30 mm diameter is subjected to a pull of 60 kN. The measured extension on a 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. 14

4. (a) Define principal planes and thus also define principal stress. 3

(b) A plane element in a body is subjected to a tensile stress of 100 MPa accompanied by a clockwise shear stress of 25 MPa. Find (i) the normal and shear stress on a plane inclined at an angle of 20° with the tensile stress and (ii) the maximum shear stress on the plane. 11

5. Draw the shear force and bending moment diagrams for the beam shown in Fig. 2. Indicate the numerical values at all important sections. Also show all the calculations. 14

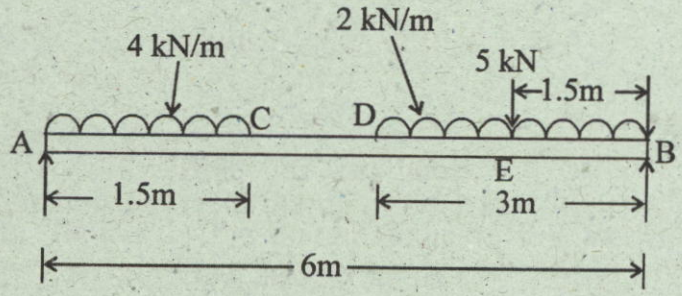

Fig. 2

6. (a) Discuss the concept of theory of simple bending. 2

(b) From the concept of theory of simple bending, derive the equation for the same. 12