

Total No. of pages : 1  
B. Tech  
MID SEMESTER EXAMINATION  
TIME: 1.5 HOURS

Roll No.-----  
CIVIL ENGINEERING  
MARCH-2019  
CE 202: MECHANICS OF SOLIDS  
MAX. MARKS: 30

NOTE: Answer ALL Questions. Assume any missing data suitably. Marks allotted to questions are written against them.

- 1. The object ABC, shown in Fig. 1, is made by joining an aluminium bar (BC) of 30 mm diameter with a steel bar (AB) of 20 mm diameter. The forces applied are shown. Determine the total deformation of the bar taking E for steel and aluminium as  $2 \times 10^5 \text{ N/mm}^2$  and  $0.7 \times 10^5 \text{ N/mm}^2$  respectively. Lengths of these portions of aluminium and steel are 1 m and 1.2 m respectively. 5

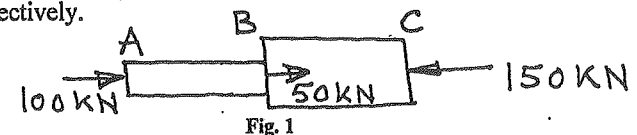


Fig. 1

- 2. A bar of 25 mm diameter is subjected to a pull of 40 KN. The measured extension on a gauge length of 200 mm is 0.085 mm and change in the diameter of bar is 0.003 mm. calculate the value of Poisson's ratio and the Young's Modulus of elasticity. 5
- 3. A piece of material is subjected to tensile stresses of  $70 \text{ N/mm}^2$  in the longitudinal direction and  $50 \text{ N/mm}^2$  at right angles to it. Find the normal and tangential stresses on a plane whose normal makes an angle of 35 degrees with the longitudinal direction. 5
- 4. A simply supported beam of span 'L' is subjected to a uniformly distributed load of intensity 'w' per unit length over its full span length. Draw SFD and BMD for the beam. 5
- 5. What do you understand by a Mohr's circle? Explain the procedure of using it for a material subjected to a biaxial state of stress. The compressive stress intensities in x and y directions are  $p_1$  and  $p_2$  respectively. Draw a neat sketch and explain how would you calculate normal and tangential stresses on a plane which is inclined at an angle  $\theta$  to the direction of stress  $p_1$ . 5
- 6. Write short notes on any two of the following topics. 5
  - a) Stress strain relationship of mild steel
  - b) Thermal stress
  - c) Hooke's law