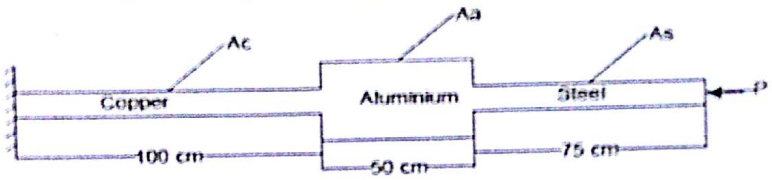
Government College of Engineering, Amravati

Applied Mechanics Department

Class Test 1	Course Code CEU 303	Strength of Materials
Date: 05/08/2017	Total Marks : 15	Time : 1 hr

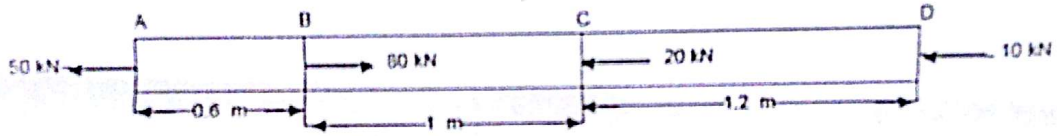
Q.1. Write expression relating (i) E and G, (ii) E and K. Hence, Derive combined relation between E, G and K. **(02)**

Q.2. A composite bar ABCD is loaded as shown in figure no.(1). If the bar contracts by 1mm (δL). What are the stresses induced in the different materials. Given cross section area as Ac = 200 mm^2, Aa=300 mm^2 and As=100mm^2. Take Ec = 10^{11} N/m^2, Ea=0.7 x 10^{11} N/m^2 and Es=2.1 x 10^{11} N/m^2. Figure no.(1) : **(03)**

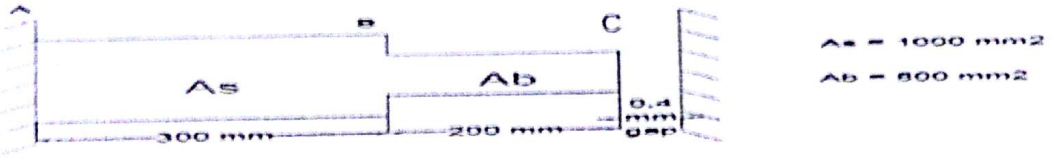


OR

Q.3. A brass bar having a cross sectional area of 1000mm^2 is subjected to axial forces as shown in figure below. Find the total change in Length of the bar. Take E=100GN/m^2. **(03)**



Q.4. A Compound bar consist of Steel portion AB of cross section area 1000mm^2 and Brass portion BC of cross section area 800 mm^2. The bar ABC is supported at A and C with a small gap at 0.4 mm at C. As shown in figure below. Calculate the maximum rise of temperature at which the bar remains stress free. Also determine the stresses induced if the temperature is raised through 80°C. **(04)**
Consider $\alpha s=12x10^{-6}/°C$, $\alpha_b=20x10^{-6}/°C$, Es=200 Gpa and Eb=85 Gpa.



Q.5. A mild steel cube of size 100mmx 30mm x 20mm is subjected to following forces, **(03)**
Compressive force of 60 kN along length direction.
Tensile force of 35kN along width direction.
Tensile force of 100 kN along thickness direction. Find strain in each direction and also find change in volume. Take E=2.1x10^5 N/mm^2 and μ=0.15

Q.6. Draw stress-strain curve for Mild Steel showing all salient features. **(03)**

Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)

Class Test I

Third Semester B. Tech. Civil / Mechanical

Winter 2013

Course Code: - CEU 303 Course: - Strength of Materials

Date: - 06/08/2013 Day: - Tuesday Time: - 03:00 pm to 04:00 pm

General Instructions: - *1) All Questions are compulsory.*
2) Figures to the right indicate full marks.
3) Due credit will be given to the neatness and cleanliness.

1. State 'True' or 'False' with reason. 4

a) If the material have same composition (and hence the same elastic properties) at every point, then it called as isotropic material.

b) The moment acting over a cantilever beam can change S.F.D.

2. A 75 mm square bar of length 500 mm is subjected to an axial compressive load of 450 kN. Determine the change in length and volume if lateral strain in one direction is prevented by application of suitable compressive stress. The modulus of elasticity and Poisson's ratio for steel are 200 GPa and $\mu = 0.25$, respectively. 5

OR

An 18 mm diameter steel rod screwed at the ends passes centrally through a copper tube of external and internal diameters of 60 mm and 48 mm, respectively. The tube is closed at each end by rigid plates of negligible thickness and the nuts on the rod are then tightened lightly on the projecting parts of the rod at 30°C. Determine the stresses induced in the rod and tube when the temperature of the composite assembly is raised to 90°C. The modulus of elasticity and coefficient of thermal expansion for steel and copper are:
$E_s = 210$ GPa ; $\alpha_s = 12 \times 10^{-6}$ per °C and $E_c = 105$ GPa ; $\alpha_c = 17.5 \times 10^{-6}$ per °C

3. Derive from first principle; S.F.D. and B.M.D. for the cantilever beam subjected to uniformly varying load of 0 kN/m at fixed end to 'w' kN/m at free end, as shown in the Figure No. 1. 6

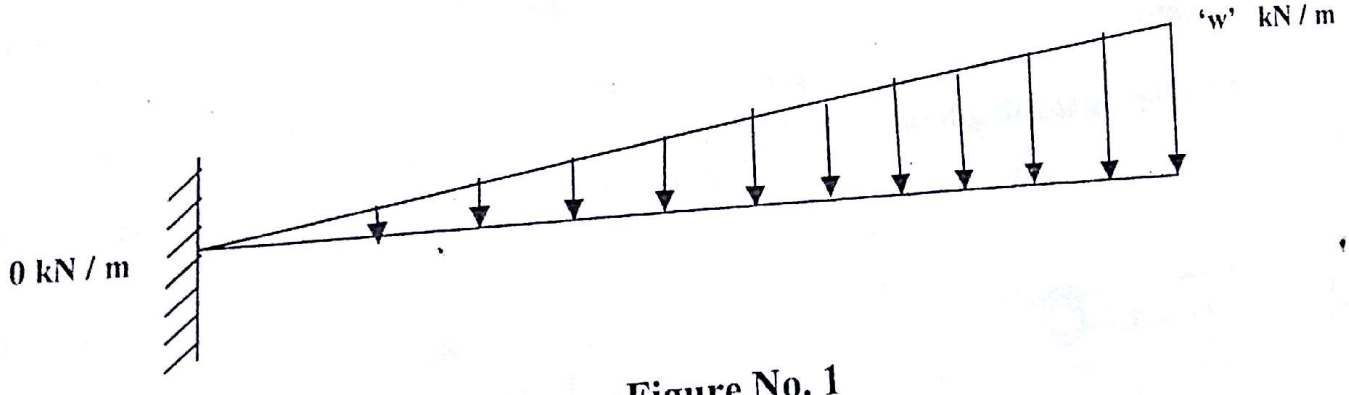


Figure No. 1