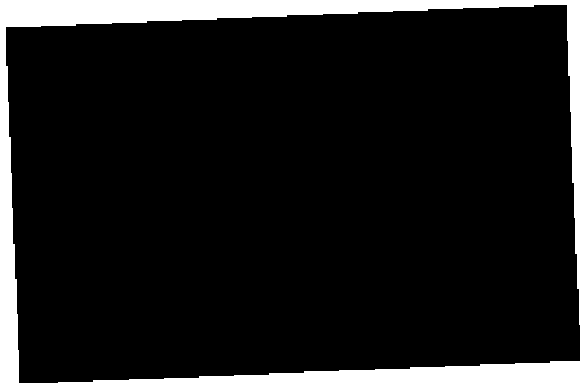
8. A hollow steel cylinder surrounds a set copper cylinder and the assembly is subjected to an axial loading of 250 kN as shown in the figure given below. The cross sectional area of the steel is 20 cm^2, while that of copper is 40 cm^2. Both cylinders are the same length before the load is applied. Determine the temperature rise of the entire system required to place all of the load on the copper cylinder. the cover plate at the top of the assembly is rigid. For copper E = 100 GPa, $\alpha = 1.7x10^{-6}/°C$., while for steel E = 200 GPa.
$\alpha = 12x10^{-6}/°C$ 20



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BACHELOR OF ARCHITECTURE ENGINEERING EXAMINATION, 2019

(1st Year, 2nd Semester)

Structural Mechanics - II

Time : Three hours Full Marks : 100

Use a separate Answer Script for each part.

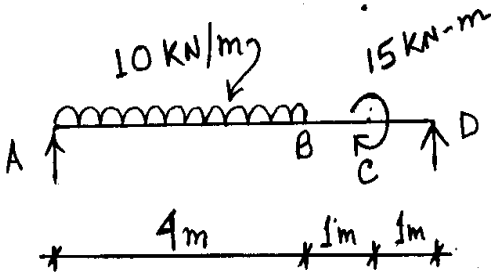
PART - I (60 marks)
Answer any ***three*** questions.
All questions carry equal marks.

1. Explain stress and strain. Define Hooke's law and Young's modulus. What is poisson's ration ?
Describe working stress method of design showing stress-strain curve of an elastic material.

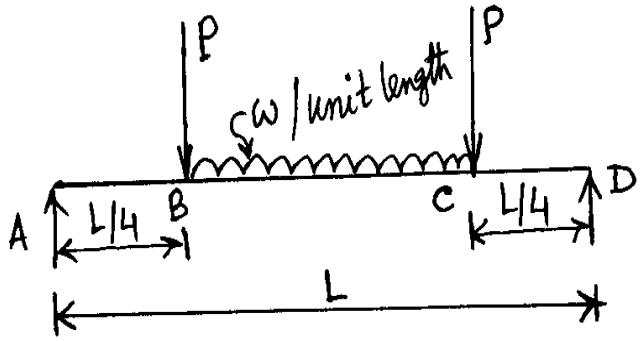
2. (a) Determine the total increase of length of a bar of constant cross section hanging vertically and subject to its own weight as the only load. The bar is initially straight.
(b) A square bar of aluminum 50 mm on a side and 250 mm long is loaded by an axial tensile force at the ends. Experimentally, it is found that the stain in the direction of the load is 0.001. Determine the volume of the bar when the load is acting. Consider $\gamma = 0.33$.

Explain the effect on volume change if the bar is made of high tensile steel or FRP.

3. Calculate the reactions, shear forces and bending moments of the following loaded beam. Also draw the shearing force and bending moment diagrams clearly.



4. Calculate the reactions, shear forces and bending moments of the following loaded beam. Also draw shearing force and bending moment diagrams clearly.



5. (a) A beam subject to pure moment, prove that

$$\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$$

where all the notations carry usual meaning.

(b) A beam of circular cross section is 200 mm in diameter, 4m in length and both ends simply supported. It is loaded by a 100 KN force at mid point. Determine the maximum bending stress in the beam.

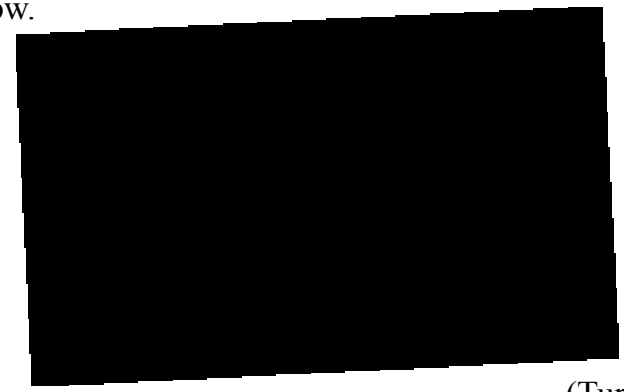
PART - II

Answer any ***two*** questions.

6. (a) Draw and explain Stress Strain Diagram for Ductile Material. 10

(b) Define Young's Modulus, Poisson Ratio, Stress and Strain. 10

7. Calculate the forces in the members of the truss shown below.



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