Ex:/ARCH/CE/T/123/2024

BACHELOR OF ARCHITECTURE ENGINEERING

EXAMINATION, 2024

(1st Year, 2nd Semester)

Structural Mechanics - II

Time: Three hours Full Marks: 100

Answer any five questions. 20x5

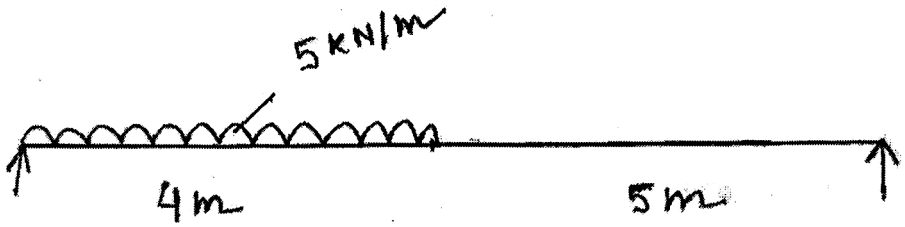
1. a) Explain stress and strain. Define Hooke's law and Young's modulus. What is poisson's ration?

   b) A 20 mm diameter brass rod was subjected to a tensile load of 40 kN. The extension of the rod was found to be 0.254 mm in the 200 mm extensionmeter. Find the elastic modulus of brass. 10+10

2. a) A standard tension test is made to determine the properties of a specimen. The specimen is a 30 mm diameter rod and it is subjected to a 10 kN tensile force. The elongation of the rod is found to be 15 mm and the decrease in diameter is found to be 0.83 mm. These observations were made in a 150 mm gauge length. Determine the modulus of elasticity, modulus of rigidity and poisson's ratio of the material.

   b) Define bulk modulus and modulus of rigidity. 15+5

3. Draw shear force and bending moment diagram for the simply supported beam shown below



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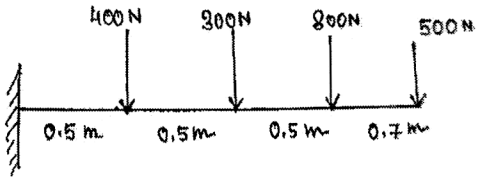
4. Draw shear force and bending moment diagram for the following beams
   a) A simply supported beam loaded with uniformly distributed load throughout its whole length.
   b) A cantilever beam loaded with a downward vertical point load at its end.

5. Draw shear force and bending moment diagram for the cantilever beam shown below



6. a) A cantilever steel beam of hollow square section of outer side 120 mm and inner side 90 mm is used on a span of 5m. Find the uniformly distributed load the beam can carry if the bending stress is not to exceed 120 N/mm^2.

   b) Three beams have the same length, same allowable bending stress and are subjected to the same maximum bending moment. The cross-sections of the beams are a circle, a square and a rectangle with depth twice the width. Find the ratio of the weights of the circular and rectangular beams with respect to the square beam.

5+15