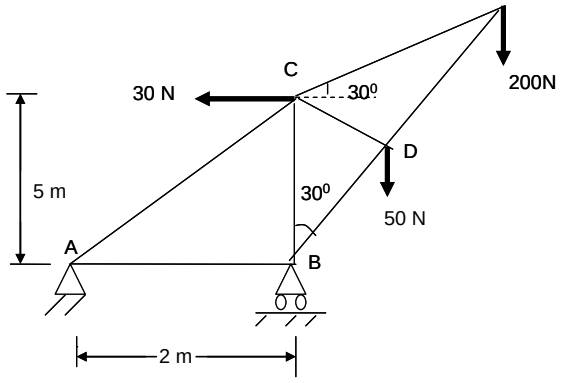
BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
FIRST SEMESTER 2023-24
Mid-Semester Examination (Closed Book)

Course No. CE F211 **Course Title: Mechanics of Solids**
Date: 12th October. 2023 **Max. Marks: 60** **Duration: 90 Mins.**

Q.1) A crane is shown in Fig.Q1, Calculate the magnitude and nature of force in member CD. [10]



FigQ.1

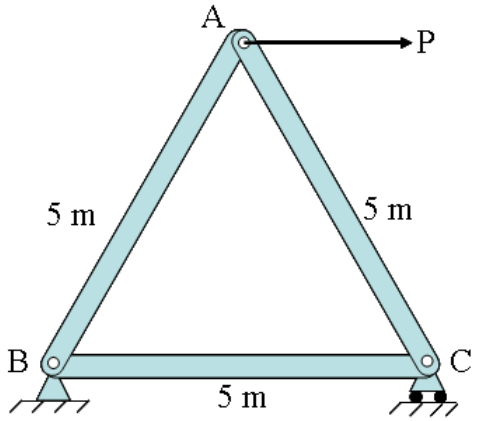


Fig.Q.2

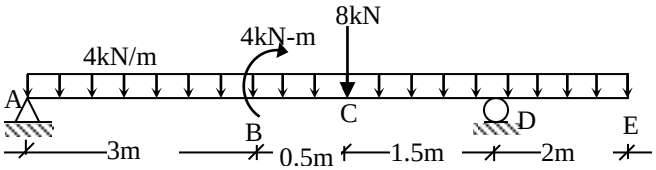
Q.2) The truss consists of three members each made of steel ($E = 205 \times 10^6$ KN/m^2) and having a cross sectional area of 4.84 cm^2. Applying the energy method determine the greatest load P that can be applied so that the roller support at C is not displaced more than 0.8 mm. [15]

Q.3) In a material in a state of plane strain, it is known that the horizontal side of a 10 x 10 mm square elongates by 4μm, while its vertical side remains unchanged, and that the angle at the lower left corner increases by 0.4 x 10^{-3} rad. Determine [15]

(a) The principal axes and principal strains.
(b) The maximum shearing strain and corresponding normal strain.

Q.4) For the beam given in **FigQ.4**

a) Calculate support reactions. [3]
b) Determine Shear Force values at points A, B, C, D & E. [6]
c) Determine the Bending Moment values at points A, B, C, D & E. [6]
d) Draw Shear Force and Bending Moment Diagram indicating values at salient points.[5]



FigQ.4