

CAD (3161903) MID SEM (CO4) 2020-21 PART 2

The exam is as per Course Outcome for ease to map cos; total mark will be converted to the mid Sem component as per GTU syllabus

(1) ATTEMPT ALL QUESTIONS (2) QUESTION 1,2 COMPULSORY AND QUESTION 3 IS IN OPTION WITH QUESTION 4 (3) FOR MARKING BEST OUT OF TWO WILL BE CONSIDERED FOR OPTIONAL QUESTION

* Required

* This form will record your name, please fill your name.

1

One dimensional elements *
(1 Point)

- Triangular element
- Rectangular elements
- Bar, spring, Beam, Truss
- Tetrahedral elements

2

Accuracy of solution __ with increase of number of beam elements *
(1 Point)

- improves
- no change
- reduces
- depends on other data

3

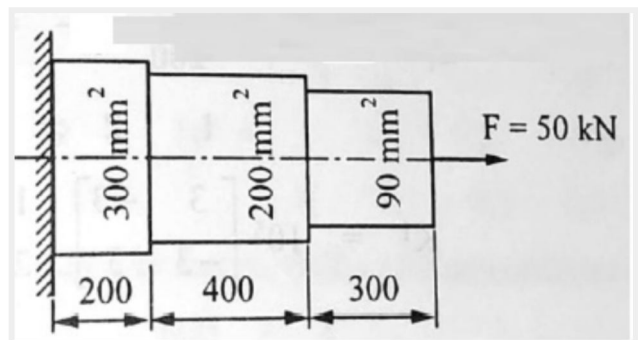
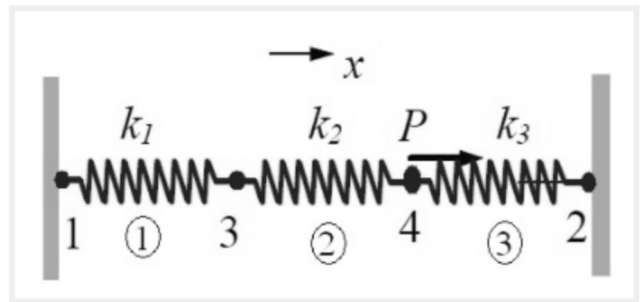


Figure shows the axial stepped bar fixed at one end. With the help of FEA estimate the reaction forces (R_1) at the support and the stresses (S_1, S_2, S_3) in each section when a force of 50 kN is applied. Consider 1D spar element and modulus of elasticity 200 GPa. Solve using elimination approach. *
(7 Points)

- $R_1 = -50000 \text{ kN}$, $S_1 = 167 \text{ kPa}$, $S_2 = 250 \text{ kPa}$, $S_3 = 555.333 \text{ kPa}$
- $R_1 = -50000 \text{ N}$, $S_1 = 167 \text{ MPa}$, $S_2 = 250 \text{ MPa}$, $S_3 = 555.333 \text{ MPa}$
- $R_1 = -50000 \text{ MN}$, $S_1 = 167 \text{ MPa}$, $S_2 = 250 \text{ MPa}$, $S_3 = 555.333 \text{ MPa}$
- $R_1 = -50 \text{ N}$, $S_1 = 1.67 \text{ MPa}$, $S_2 = 2.50 \text{ MPa}$, $S_3 = 5.55333 \text{ MPa}$



For the spring system as shown in figure , stiffness $K_1 = 100$ Newton per milimeter, stiffness $K_2 = 200$ Newton per mili meter, stiffness $K_3 = 300$ Newton per mili meter, load $P = 500$ Newton, Find: (1) displacements of nodes 1,2,3 and 4 (2) the reaction forces at nodes 1 and at node 2 (3) the force in the spring 2 *
(7 Points)

- (1) 0, 1, 0.91, 1.36, (2)-90.90, 400.82 (3) -90.90,90.90
- (1) 0, 0, 0.91, 1.36, (2)-90.90, 400.82 (3) -90.90,90.90
- (1) 1, 0, 0.91, 1.36, (2)-90.90, 400.82 (3) -90.90,90.90
- (1) 0, 0, 0.91, 1.36, (2)-90.90, 500.82 (3) -90.90,90.90

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