CE2008D STRUCTURAL ANALYSIS I

Winter 2019-20

Homework Assignment – Module: 2

S is your class serial number; bring the completed assignment as and when you return to the campus

1. (a) For the three-span continuous beam shown in Fig. 1, determine all the support reactions and draw the shear force and bending moment diagrams. Given: $E = 200\,\text{GPa}$, $I = (4 + 0.1 \times S) \times 10^{-4}\,\text{m}^4$, $w = 5 + 0.4 \times S\,\text{kN/m}$, $P = 22 + 0.5 \times S$, $Q = 32 + 0.3 \times S$ and $a = 1.5\,\text{m}$.
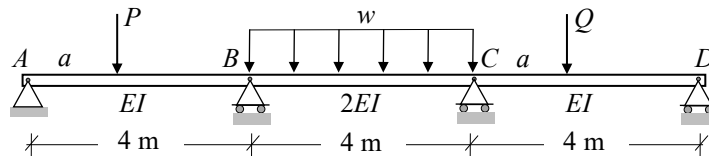

Figure 1

(b) In the above problem, if the support *B* sinks by 5 mm and the support *C* sinks by 8 mm, find all the support reactions and draw the shear force and bending moment diagrams. (Hint: The compatibility conditions get modified correspondingly)

2. (a) For the two-span continuous beam shown below in Figure 2, determine all the support reactions and draw the shear force and bending moment diagrams. Given data: $E = 200\,\text{GPa}$, $I = (20 + 0.2 \times S) \times 10^{-4}\,\text{m}^4$, $w = 8 + 0.3 \times S\,\text{kN/m}$, $P = 50 + 0.4 \times S$ and $a = 2\,\text{m}$.
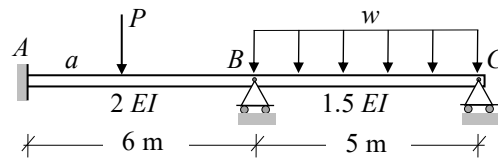

Figure 2

(b) In the above problem, if the support *B* sinks by 6 mm and the support *C* sinks by 4 mm, find all the support reactions and draw the shear force and bending moment diagrams. (Hint: The compatibility conditions get modified correspondingly)

(c) [Question for pondering] In the above problem (Fig. 2), if the fixed support at *A* gives way so that there is a clockwise rotation of 0.0001 rad and the support at B sinks by 6 mm, how will you solve the problem?

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