Ministry of Higher Education
Giza Higher Institute for Eng. & Tech.
Civil Engineering Department
Course Name: **Theory of Structures (3)**
Course Code : **CIV 301**

Academic Year : **2015-2016**
Semester : **First**
Level : **3rd**
Time : **3 Hours**
Date : **10 / 1 / 2016**
Examiner: ***Dr. M. Abdel-Kader***

First Semester Final Exam

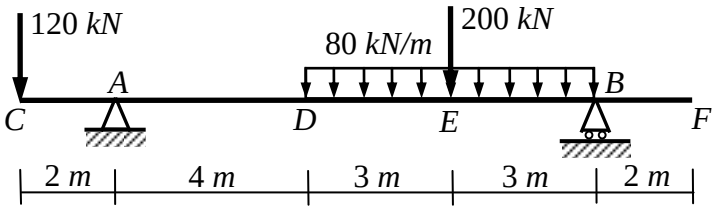
- Attempt all questions.
- The Exam consists of **5** questions in **1** page.
- Maximum grade is **60 Marks**

Question (1): (12 Marks)

For the shown beam, using the **double integration method**, determine:

(a) the deflections at ***C***, ***D*** and ***F***
(b) the slopes at ***C*** and ***D***
and sketch the elastic curve of the beam.

$EI = 0.2\times10^9\ N.m^2$

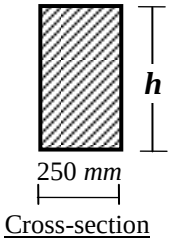


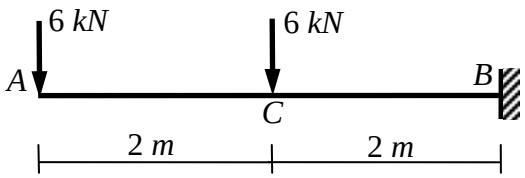
Question (2): (12 Marks)

For the shown cantilever of rectangular cross-section 250 *mm* wide by ***h*** *mm* high, using the **moment-area method**, determine:

(a) the height ***h*** if the maximum deflection is not to exceed 10 *mm*
(b) the deflection at ***C*** (*use the calculated* ***h***)
(c) the slope at ***A*** (*use the calculated* ***h***)
and sketch the elastic curve of the cantilever.

$E = 9\ GPa$



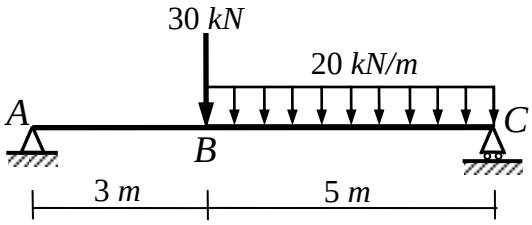


Question (3): (12 Marks)

For the shown beam, using the **conjugate beam method**, determine:

(a) the slopes at ***A*** and ***B***
(b) the deflection at ***B***
and sketch the elastic curve of the beam.

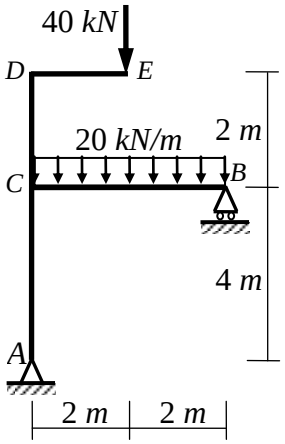
$E = 200\ GPa$ $I = 290\times10^6\ mm^4$

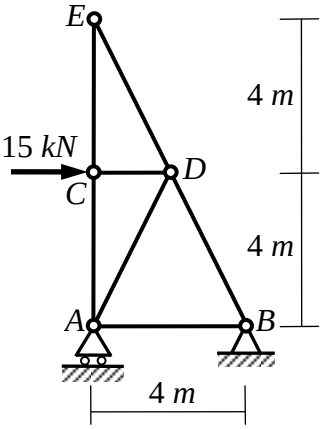


Question (4): (12 Marks)

For the shown frame and truss, using the **virtual work method**, determine the horizontal displacements at ***E*** (δ_{Eh}).

For the frame, $EI = 50\times10^3\ kN.m^2$.
For the truss, assume that all members have the same axial rigidity $EA = 10000\ kN$.



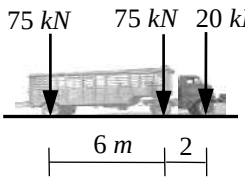


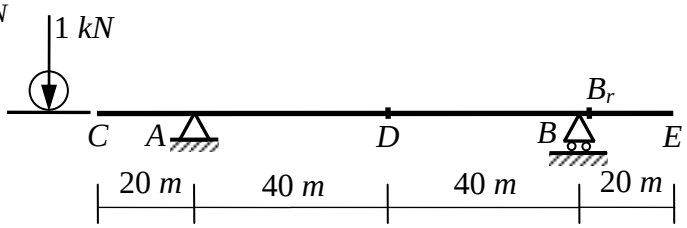
Question (5): (12 Marks)

For the shown beam, draw the influence lines for:

(a) the reactions A_y, B_y.
(b) the shear forces at the sections D and B_r
(c) the bending moments at the sections A and D.

Also, determine the maximum positive and negative moments at D caused by the shown moving truck.





With my best wishes
Dr. M. Abdel-Kader