Ministry of Higher Education
Giza Higher Institute for Eng. & Tech.
Civil Engineering Department
Course Name: **Computer Applications in Civil Eng.**
Course Code : **CIV 410**

Academic Year : **2016–2017**
Semester : **Second**
Level : **4th**
Time : **1½ Hours**
Date : **26 / 3 / 2017**
Examiner: ***Dr. M. Abdel-Kader***

Student Name: Code:

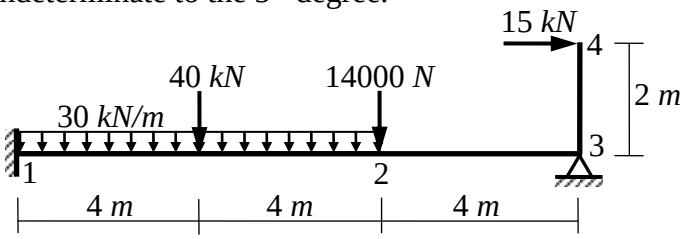
Answer of Mid-Term Exam

- The Exam consists of **2** questions in **2** pages.

Question (1): (7 Marks) wrong answer = -1 Mark

(a) TRUE or FALSE (Put ✓ or ✗ in front of the statement number in your answer sheet)

1. The abbreviation "CAD" means Computer-Aided Design and the abbreviation "SAP" means Statics And Problem.
2. The abbreviation "DOF" means Degree of Freedom.
3. In space frames, there are 6 DOF per free node, which are 3 translations and 3 rotations.
4. In plane frames, there are 3 DOF per free node, which are 1 translation and 2 rotations.
5. Bar element used in modeling trusses has two nodes at its ends, every node has 4 d.o.f.
6. The structure shown below has 7 non-zero DOF.
7. The structure shown below is statically indeterminate to the 5th degree.



(b) Choose the correct answer (**Put a, b, c or d in front of the statement number in your answer sheet**).

1. In SAP, properties of material and load combinations are considered as
   a) Results of the analysis.
   b) Input data.
   c) Output data.
   d) Always not required in the analysis.
2. The responsibility of the analytical model results lies on
   a) The structural designer who used the software.
   b) The company developed the software.
   c) The input data.
   d) The computer used.
3. Stiffness is the property of an element which is defined as
   a) Displacement per unit area.
   b) Force per unit displacement.
   c) Force per unit mass.
   d) Displacement per unit force.

Answer:

(a)

1.	✗
2.	✓
3.	✓
4.	✗
5.	✗
6.	✓
7.	✗

(b)

1.	b
2.	a
3.	b

Please turn over

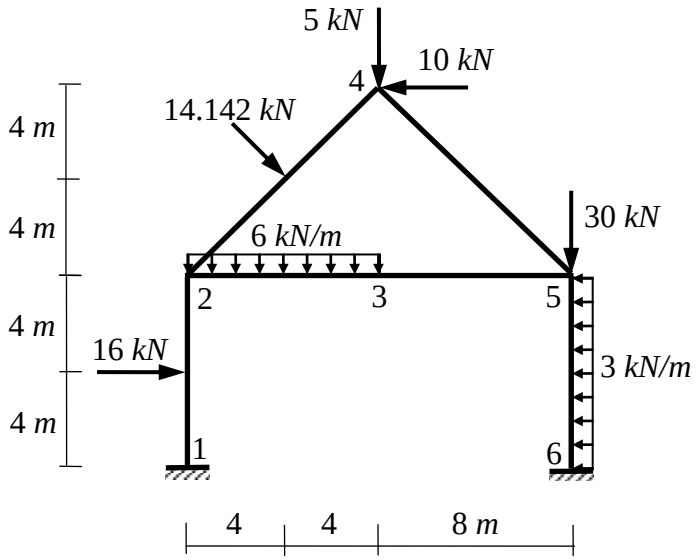
Question (2): (8 Marks)

The matrix equilibrium equation of the shown plane frame is:

$$\{F\} = [K]\{\Delta\} + \{F^f\}$$

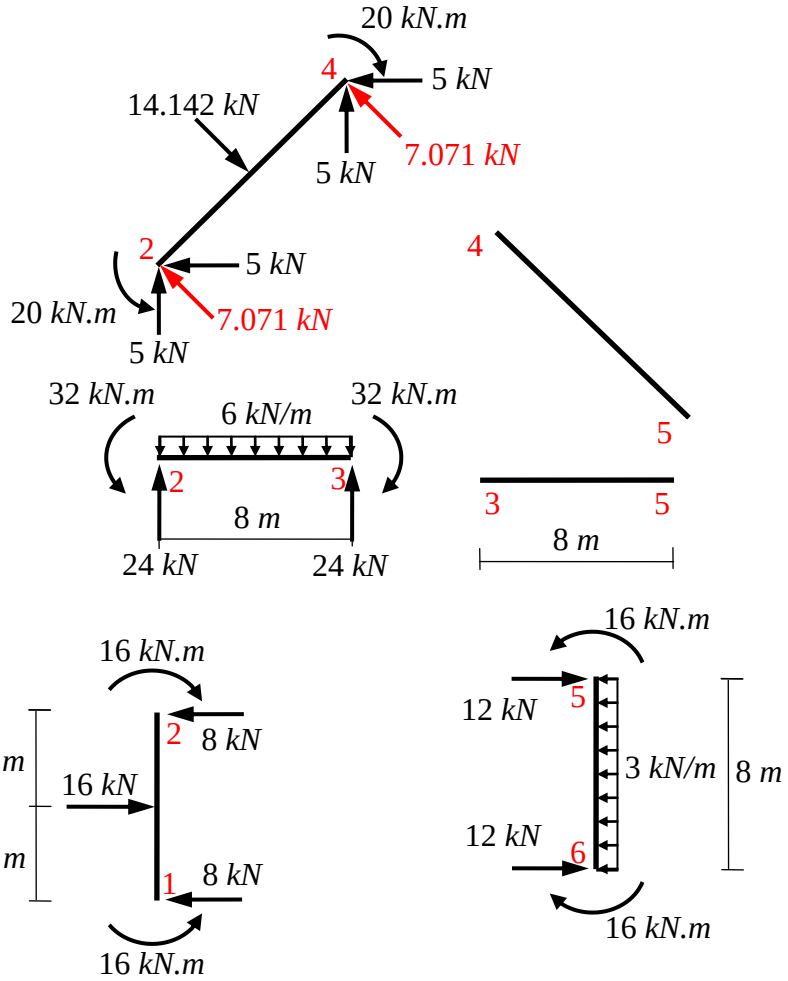
Write:

- The nodal forces vector $\{F\}$
- The nodal displacements vector $\{\Delta\}$
- The fixed end solution $\{F^f\}$



Answer:

$$\{F\} = \begin{Bmatrix} X_1 \\ Y_1 \\ M_1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ -10 \\ -5 \\ 0 \\ 0 \\ -30 \\ 0 \\ X_6 \\ Y_6 \\ M_6 \end{Bmatrix} \quad \{\Delta\} = \begin{Bmatrix} 0 \\ 0 \\ 0 \\ u_2 \\ v_2 \\ \theta_2 \\ u_3 \\ v_3 \\ \theta_3 \\ u_4 \\ v_4 \\ \theta_4 \\ u_5 \\ v_5 \\ \theta_5 \\ 0 \\ 0 \\ 0 \end{Bmatrix} \quad \{F^f\} = \begin{Bmatrix} -8 \\ 0 \\ 16 \\ -13 \\ 29 \\ 36 \\ 0 \\ 24 \\ -32 \\ -5 \\ 5 \\ -20 \\ 12 \\ 0 \\ 16 \\ 12 \\ 0 \\ -16 \end{Bmatrix}$$



With my best wishes

Dr. M. Abdel-Kader