Minoufia University
Faculty of Engineering
Shebin El-Kom
Final Examination
Academic Year: 2016-2017

Department: Civil Eng.
Year: Diploma
Nonlinear static analysis CVE504
Time Allowed: 3 hours
Date: 29 May 2016

Open book exam
Answer all the following questions **[Total 100 Marks]**

Q(1) [20 Marks]

Calculate and draw the large deflection of a beam with hinged supports with a span of 10m and cross section of 25x35 cm of concrete. The beam is loaded with 5.0 tons at its midpoint. Assume any other missing data.

Q(2): [20 Marks]

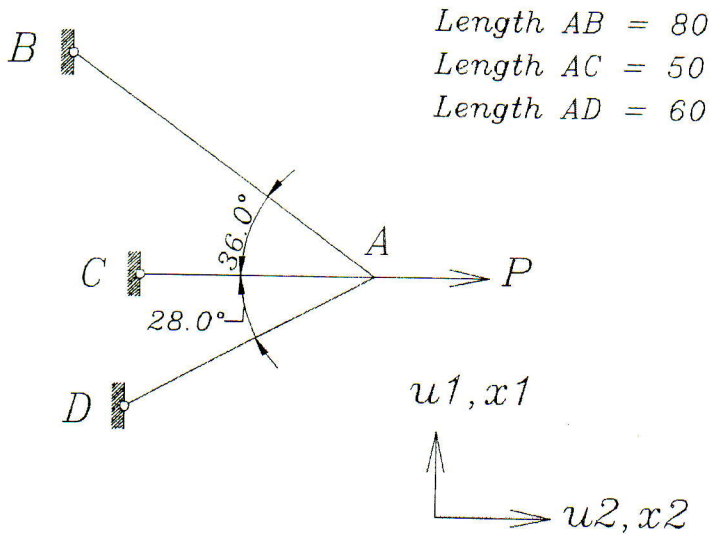
Derive an equation from nonlinear geometry for a moderate thick beam.

Q(3) [30 Marks]

For the shown three-member truss, the material can be represented by Romberg-Osgood material type. Find the equation of the material model ($\sigma/E = \varepsilon + K\varepsilon^N$), if the stress strain relationship of its material is given by the following table.

Stress in psi	0	11.59	20.18	23.76	25.5	26.72	27.65	28.42	29
strain	0	0.008	0.016	0.024	0.032	0.04	0.048	0.056	0.064

Calculate the large deformation if the force P= 5.0 tons. The area of cross section of each member = 200 mm^2 .



Q(4) [20 Marks]

Discuss 3 nonlinear material models showing their mathematical model, parameters needed to define the model, the type of real-life application of each model.

Q[5] [10 marks]

Discuss two numerical equation solvers, their concept and suitability for what size of problems.

****** Good luck *****
Dr. Ahmed Elshafey