FINITE ELEMENT ANALYSIS

**Software:**Other (i will specify in paper details)

**Paper details:**

TASK 1: Analysis of a two-dimensional truss The following two-dimensional truss is composed of three members made of steel. Member (1) is 4 m in length, member (2) is 3 m, and member (3) is 5 m. The truss is loaded as shown in Figure 1. Assuming that the cross-sectional area A = 138.89 mm2 is constant for each of the three members and that the Young’s Modulus for steel is 200 GPa. Figure 1 Determine the following: 1. The global stiffness matrix for the truss. (15 marks) 2. The nodal deflections. (35 marks) 3. The support reactions. (10 marks) 4. The stress on each element. (20 marks) 5. The nodal forces on each element. (20 marks) TASK 2: Finite element analysis of engineering component. The configuration of the specimen shown in Fig. Q1 has a thickness of 3 mm. The material behaviour is linearly elastic with the following properties: o Elastic Modulus = 70 G Pa o Poisson ratio = 0.3 o Yield stress = 150 M Pa Fig. Q1 You are required to conduct a compression test using ANSYS finite element code. o CreateafiniteelementmodelofthegeometryinFig.Q1,usingashellelement; o Apply appropriate boundary conditions and vertical distributed load of 2 N /mm at one end of the cylinder; o Show plots for the discretization, von mises stresses etc o Discuss the result taking cognizance of the effect of the boundary configurations; o Calculate the stiffness; o Calculate the elastic strain and compare with the FEA result; explain any difference. 1. Introduction [10 marks] 2. Method [20 marks] 3. Results [30 marks] 4. Discussion [25 marks] 5. Conclusion [10 marks] 6. References [5 marks]