**2017-2018 Fall**

**Strength of Materials HW 2**

**Yildiz Technical University**

**Civil Eng. Dept.**

**Division of Mechanics**

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**ID#:**

**Group#:**

**Name:**

**NOTE: Homeworks will not be accepted after due date!**

**Due: 07.12.2017 - 08.12.2017**

**Conditions Listed Below!**

1. Strains due to acting forces are measured as  for the block given below. Find
   1. Energy density.
   2. Total strain energy.
   3. Volumetric strain energy.
   4. Distortional strain.



**2)** The cylindrical bar has pipe and circular cross-sections between AD and DC respectively. Solve for following conditions separately. P=110 kN, E=4 GPa

1. What would be the cavity diameter **d** in case of AC bar getting 8 mm shorter? Find strain energy of the AC bar for the d value you have found.
2. If **d**=30 mm then find the length of the pipe section AD along axial (z) direction such that AC bar becomes 8 mm shorter?
3. If **d**=30 mm then find the new point of application (distance from C) of P load at C such that AC becomes 8 mm shorter?



**3)** AD bar has variable cross-section and it carries forces acting at points B and D beside its own weight. If and E=100 GPa then

1. Draw Normal Force (N) diagram.
2. Find maximum stress.
3. Find Vertical displacements at C and D points.



**4)**For the system shown assume.

1. Find P max.
2. Support reaction at B.
3. Displacement at B. (E=2.105 MPa, A=10 cm2)



**5)**Circular bar made from material 1 is placed inside the pipe which is made from material 2. System is attached to a rigid plate at the bottom and rigid Wall at the top. Initial temperature of the system is 10 0C.

1. What is the required temperature change for the 0.05 cm gap to be closed?
2. What is highest operation temperature for the system under safety condition?





**6)**  For the system given below; If  Find;

1. Rivet diameter **“d”.**
2. Plates’ thicknesses (**t1, t2)**.
3. Plates’ widths (**b1, b2)**.



**HW Submission Hours**

**07.12.2017 Time: 10:00 - 17:00**

**08.12.2017 Time:10:00 - 17:00**

**NOTE: HWs’ will be submitted on the EXACT day and the time declared above!**

**All evaluation interviews will be carried out by Res. Ass. Ali Mercan.**

**(Civil Eng. Department B Blok 1-039 room.)**

SOLUTİONS

1. a) 

b) 

c) 

d) 

2) a) d=23,86 mm ; 

b) z=183,1 mm

c) 4,162 mm

3) b) 

c) 

4) a)

b) 

c) 

5) a) 

b) 

6) a) d= 10,93 mm

b) 

c) 