Quiz 1

Aerospace Structural Mechanics (AE238)

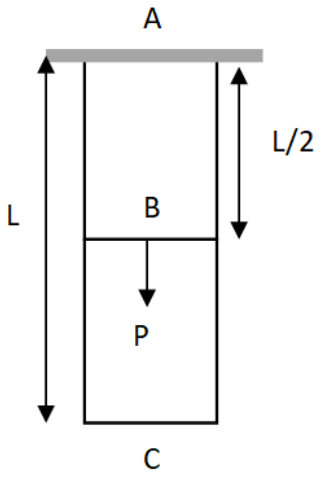
Time: 30 Minutes **Total Marks: 10**

Q1. The displacement field in micro units for a body is given by

$$\boldsymbol{U} = (x^3 - 3y + z)\mathbf{i} + (-zx + y^2)\mathbf{j} + (zx^4 - 1.5z + yx)\mathbf{k}$$

Determine the rectangular strain components at $(-1, 1, -1)$. [3]

Q2. Consider a uniform bar of weight W, Young's modulus E, cross-section area A and length L as shown in figure. A vertical load P acts at a distance L/2 from fixed end A. Find the value of P for which deflection of point B is zero.



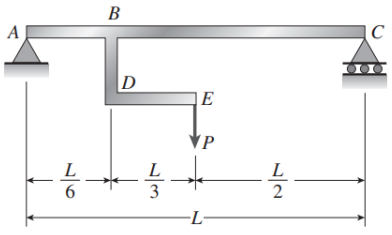
[3]

Q3. The plane stress components at a point in a body are given by

$$\sigma_{xx} = 2x^3y^2 \text{ , } \sigma_{yy} = xy^4 \text{ , } \tau_{xy} = -2x^2y^3$$

Verify whether it satisfies the equilibrium condition. [2]

Q4. Draw the free body diagram of the beam shown in figure. Find the reactions at A and C.



[2]