

國立成功大學
114學年度碩士班招生考試試題

編 號：111

系 所：生物醫學工程學系

科 目：工程力學

日 期：0210

節 次：第 2 節

注 意：1. 可使用計算機
2. 請於答案卷(卡)作答，於
試題上作答，不予計分。

1. Given a rod (Fig. 1) supported by three single journal bearings at A , B , and C .
 (a) Draw a free body diagram for the rod. (9%)
 (b) Judge if this problem can be solved and explain why? (4%)

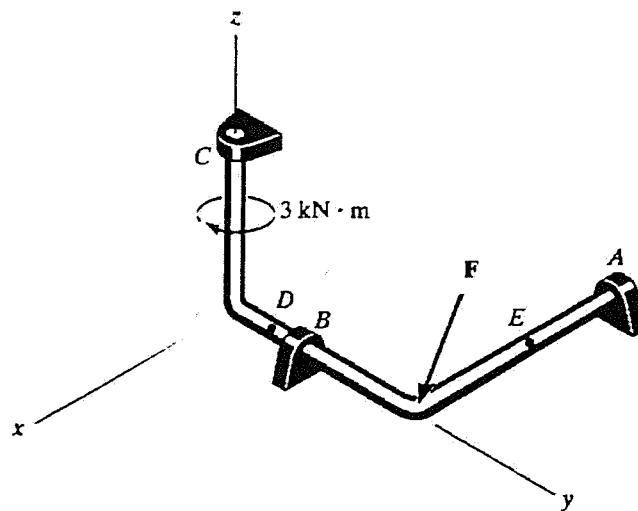


Fig. 1

2. Given a K-type truss as shown in Fig. 2.
 (a) Indicate zero-force members. (6%)
 (b) Determine the support reactions at A and G . (8%)
 (c) Determine the force in members KJ and ND of the truss. Indicate if the members are in tension or compression. (15%)

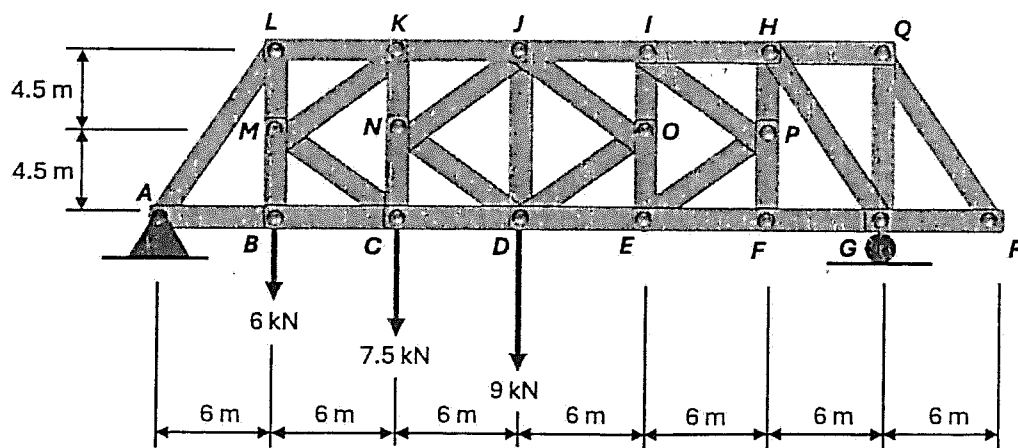


Fig. 2

3. A beam (negligible mass) is supported by a hinge at A and a roller at C , and bears some loadings as shown in Fig. 3.
 (a) Replace the force and couple moment system acting on the beam by an equivalent resultant force. (8%)
 (b) Find where the equivalent resultant force's line of action intersects in beam when measured from point A . (5%)
 (c) Draw shear and moment diagrams for the beam. (15%)
 (d) Given the beam's upper moment limit is $37 \text{ kN}\cdot\text{m}$, will it break and how to protect it if needed? (3%)

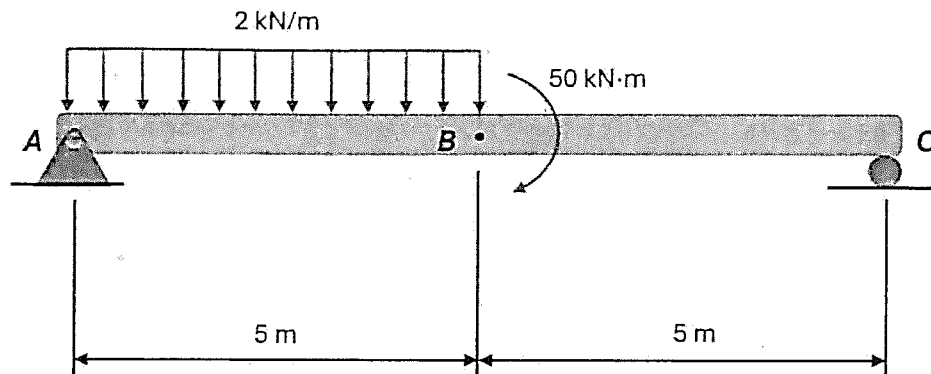


Fig. 3

4. A composite geometrical shape is shown in Fig. 4.

- Locate the centroid of the shaded area. (6%)
- Let the shaded area revolve 180° about the y axis. Calculate the total surface area and the volume of the 3D object. (Hint: Pappus and Guldinus Theorem) (13%)
- If the 3D object is homogeneous and can just float under water (density $= \rho_f$) after carrying a mass m , determine its density ρ in terms of m , ρ_f , and a . (8%)

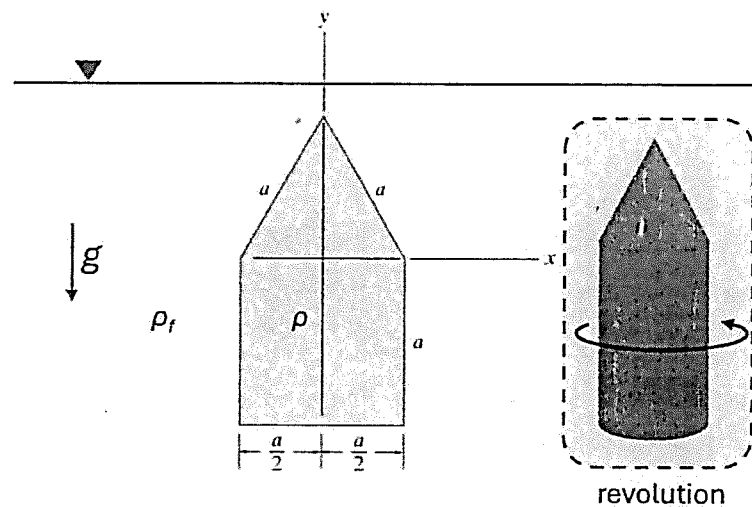


Fig. 4